Quackenbush®

15QNPD-D & 15QNPDF-D NUTPLATE DRILL

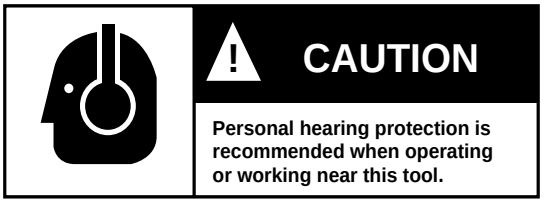
Recoules Operation
Zone industrielle - B.P. 28
Avenue Maurice Chevalier
77831 Ozoir-la-Ferriere Cedex France

Safety Recommendations

For your safety and the safety of others, read and understand the safety recommendations and operating instructions before operating any drill motor.

Always wear protective equipment:

For additional information on eye protection, read the latest edition of ANSI Z87.1, Occupational and Educational Eye and Face Protection. This standard is available from the American National Standards Institute, Inc., 11 West 42nd Street, New York, N.Y. 10036.



Hearing protection is recommended in high noise areas (above 85dBA). Close proximity of additional tools, reflective surfaces, process noises, etc., can contribute substantially to the sound level experienced by the operator.

Follow good machine shop practices. Rotating shafts and moving components entangle and entrap, and may result in serious injuries. Never wear long hair, loose-fitting clothes, gloves, ties, or jewelry when working with or near a drill of any type.

Quackenbush drills are designed to operate on 90psig (6.2 bar) maximum air pressure using the proper size hose. Excessive air pressure increases the loads and stresses on tool parts and drills, and may result in breakage. The installation of a filter-regulator-lubricator in the air supply line ahead of the tool is highly recommended.

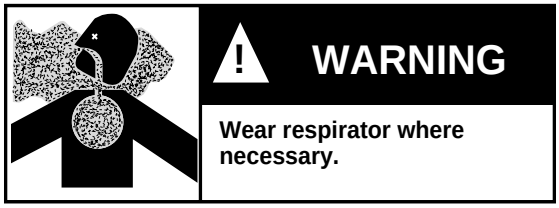
CAUTION

- Before the tool is connected to the air supply, the throttle should be checked for proper operation (i.e., throttle valve moves freely and returns to closed position).

- Before removing a tool from service or changing drill bits, make sure the air line is shut off and drained of air. This will prevent the tool from operating if the throttle is accidently engaged.

- Cutting tools used with these drill motors are sharp. Handle them carefully to avoid injury.

- The collet and mandrel must be inserted into a properly sized pre-drilled hole before starting the tool. An improperly sized pre-drilled hole prevents the mandrel from engaging the collet and could result in slippage of the tool. An improperly selected collet and mandrel can also result in slippage of the tool.



Drilling or other use of this tool may produce hazardous fumes and/or dust. To avoid adverse health effects, utilize adequate ventilation and/or a respirator. Read the material safety data sheet of any cutting fluids or materials involved in the drilling process.

CAUTION

Some non-ferrus metal chips (or dusts) are combustible. Examples: Aluminum, magnesium, Titanium, and Zirconium. See the material safety data sheets for combustibility of materials drilled. Never collect spark generating material with combustible material. Examples: Collecting both steel and aluminum or steel and titanium.

CAUTION
Slip and fall hazard.
• Lubricant and coolant systems must be properly maintained to avoid leakage.
• Hoses must be organized and care taken to avoid tripping.

Quackenbush drills are often used with lubricant or cooling systems which must be properly maintained to avoid leakage. Failure to do so can result in serious injuries from slipping on oily surfaces.

Safety Recommendations

WARNING
Keep hands away from clamping and feed mechanisms. Clamp mechanism moves when drilling and connecting or removing air supply.

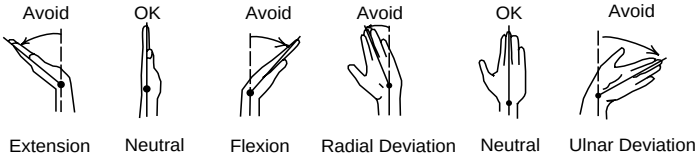
Due to the number and variety of tooling applications, the user's methods engineering departments, ect., must consider any hazards that may be associated with each specific application of this product and provide adequate operator protection from inadvertent contact with any moving components. The clamping and feed mechanisms of self-colleting drill motors are exposed for visibility and can move when the air supply is connected or disconnected. To avoid injury, keep fingers and hands away from these areas when handling or operating this tool.

Some individuals are susceptible to disorders of the hands and arms when exposed to vibration and/or tasks which involve repetitive work motions. Those individuals predisposed to vasculatory or circulatory problems may be particularly susceptible. Cumulative trauma disorders such as carpal tunnel syndrome and tendinitis can be caused or aggravated by repetitious, forceful exertions of the hands and arms. These disorders develop gradually over periods of weeks, months, and years. Tasks should be performed in such a manner that the wrists are maintained in a neutral position, which is not flexed, hyperextended, or turned side to side. Stressful postures should be avoided and can be controlled through tool selection and work location.

Any tool operator should be aware of the following warning signs and symptoms so that a problem can be addressed before it becomes a debilitating injury. Any user suffering from prolonged symptoms of tingling, numbness, blanching of fingers, clumsiness or weakened grip, inability to hold objects, nocturnal pain in the hand, or any other disorder of the shoulders, arms, wrists, or fingers should notify their employer so that a review of what steps might be taken to prevent further occurances. These steps might include but are not limited to, repositioning the workpiece or redesigning the workstation, reassigning tool users to other jobs, rotating jobs, changing worker pace, and/or changing the type of tool used so as to minimize stress on the operator. Some tasks may require more than one type of tool to obtain the optimum operator/ tool/ task relationship.

The following recommendations will help reduce or moderate the effects of repetitive work motions. The operator of any drill should:

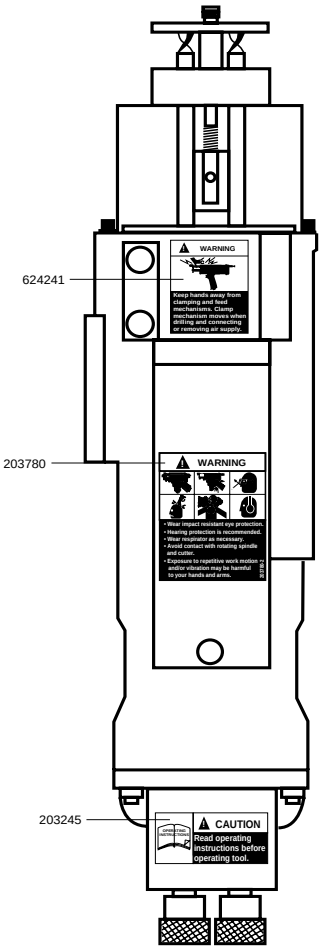
- Use a minimum hand grip force consistent with proper control and safe operation
- Keep body and hands warm and dry
- Avoid anything that inhibits blood circulation
  - ~~S~~moking Tobacco
  - ~~C~~old Temperatures
  - ~~C~~ertain Drugs



- Avoid awkward postures
- Keep wrists as straight as possible
- Interrupt work, activities, or rotate jobs to provide periods free from repetitive work motions.

Safety Labels

The safety labels found on this tool are an essential part of this product. Labels should not be removed. Labels should be checked periodically for legibility. Replace safety labels when missing or when the information can no longer be read. Replacement labels can be ordered by the part numbers shown on this page.


624241
WARNING
Keep hands away from clamping and feed mechanisms. Clamp mechanism moves when drilling and connecting or removing air supply.
203780
WARNING
Wear impact resistant eye protection.
• Hearing protection is recommended.
• Wear respirator as necessary.
• Avoid contact with rotating spindle and cutter.
• Exposure to repetitive work motion and/or vibration may be harmful to your hands and arms.
203245
CAUTION
Read operating instructions before operating tool.

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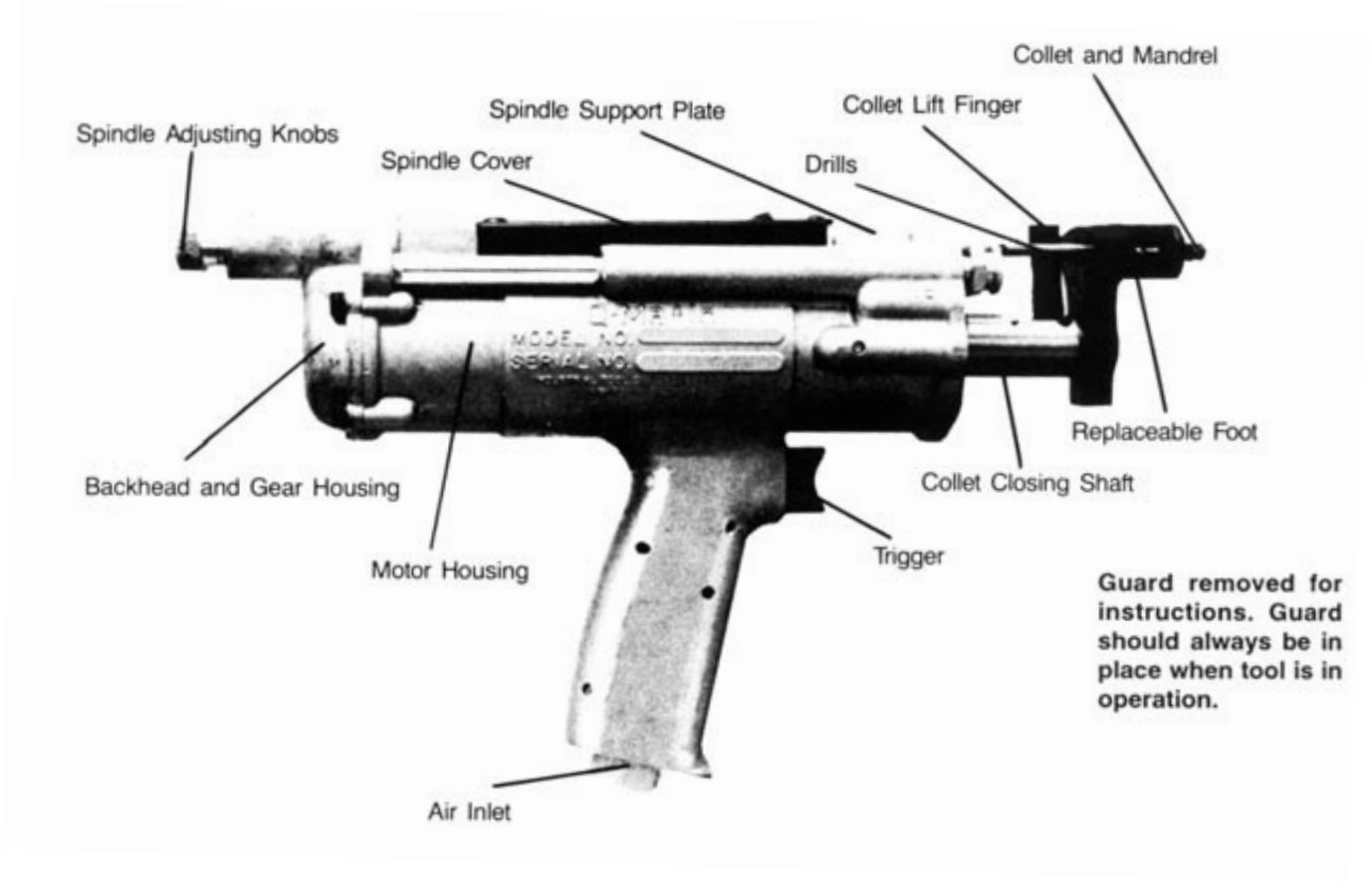
Major Tool Component Nomenclature



Introduction and General Information

The Q-Matic nut plate drill motor has been developed for drilling an countersinking the two holes required for attachment of nut plate fasteners.
Utilizing an air/hydraulic system, and expanding collet grips the work with 240 lbs. holding force during the complete drilling and countersinking operation.
The air powered motor develops 1HP and consumes 35 CFM at 90 psi, the recommended air line pressure. The tool developes 200 lbs. of drilling thrust, and is capable of drilling holes up to .128 in. diameter in aluminum. Total feed stroke is .562 in.; maximum colleting stroke is .400 in.
Each Q-matic nut plate drill can be used to drill holes for all three types of nut plate fasteners: single wing, double wing and Mickey Mouse. By simply changing the front bearing support block, lift finger and pressure foot, one tool can be used for all types of nut plate fasteners. This feature eliminates the need for a specific tool to drill and countersink the varied nut plate configuration.

Depth Control

Individual spindle adjustment knobs located at the rear of the tool controls the countersink depth accuracy to within + or - .001 in.
Depending upon the hardness of the material being drilled, drilling cycle time can be adjusted from 1.5 sec. to 34 sec. by means of an externally mounted feed control valve.
The Q-Matic nut plate drill is available in three speed models: 600 rpm, 6,000 rpm and 20,000 rpm. An adjustable throttle control valve located in the handle enables the tool spindle speed to be reduced as much as 50%, allowing the tool rpm to be matched to the material being drilled, thereby providing optimum drill bit life.
An optional externally mounted pneumatic booster pump is available for use on the 600 rpm models. This optional pump increases both thrust and clamping force of the tool by as much as two and one-half times.

Tool Start-Up

The Q-Matic nut plate drill motor is shipped from the factory equipped to the customer's specifications; spindle RPM, nut plate styles, drill spindle spacing and optional booster pump (if needed). Collets, mandrels and drills can be supplied for customers with start-up nut plate drilling applications.

After unpacking, examine the customer specified equipment on the Q-Matic tool to verify style and size of components.
Attach air line to 1/4" NPT inlet bushing. If 1/4" quick disconnect plugs are minimum recommended size for standard units and 3/8" quick disconnect fittings are minimum recommended size for units with booster pumps, the recommended air hose size is 3/8" inside diameter equipped with in-line filter and lubricator.
With air line attached, pull trigger to start tool and allow tool to run through a full cycle with drills in fully extended position. When trigger is released, drills return to original position and collet extends to open position.
To adjust depth of countersink, turn the spindle adjusting knobs at the rear of the tool to the appropriate depth. Turning the knobs counterclockwise reduces depth; clockwise increases depth.
Testing the tool on a separate piece of material will insure that the tool is operating properly and that the countersink depth has been accurately set.
Use a conventional drill to drill the pilot hole in the material. The size of this pilot hole should match the diameter of the collet and mandrel selected for the tool.
Insert the collet in the pilot hole while holding the pressure foot firmly against the surface to be drilled, and actuate the trigger. The collet will retract and clamp the tool firmly against the work while the two drills will begin feeding into the material. The drilling cycle is complete when the drills have reached the maximum pre-set depth. Releasing the trigger will cause the drills to retract and the collet to release.
The tool is now ready to begin another cycle.

Tool Operation

Optimum performance of the Q-Matic nut plate drill motor requires a supply of clean, 90 psi air at 35 cfm. Using an in-line lubricator will provide the proper lubrication for the air motor and will significantly increase tool life expectancy.
Because O-rings are extensively used to seal systems within the tool, the elimination of foreign particles and other contaminants will reduce the possibility of damage to these parts. Always inspect O-rings for damage or wear, and replace as required. The use of silicone O-ring lubricant is strongly recommended during reasembly. The addition of oil in the air line will also increase motor and valve life as well as the life of the O-rings.

1. Diagram of air and hydraulic systems in standby condition (trigger released, compressed air attached)

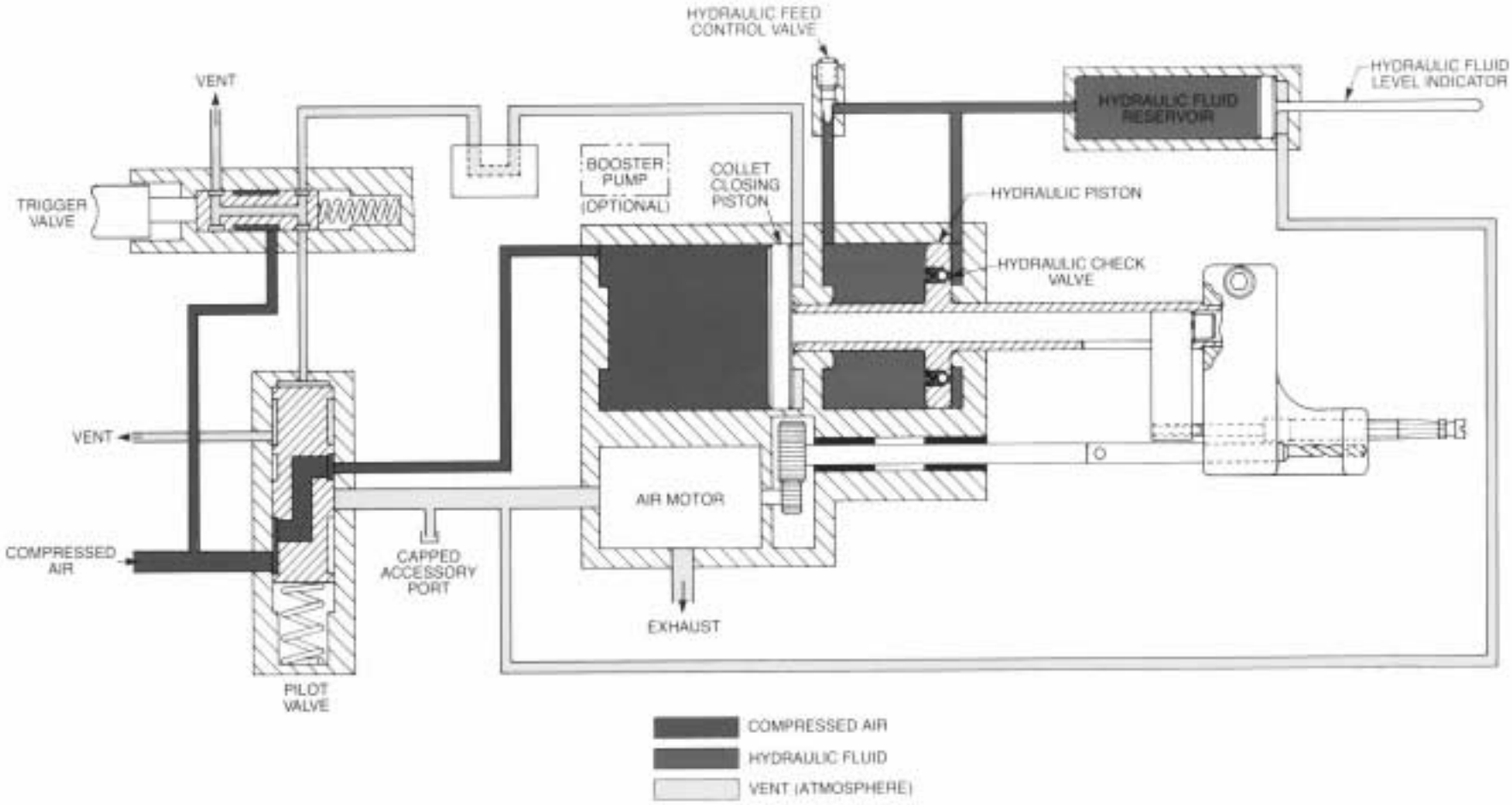


FIGURE 1.

2. Diagram of air and hydraulic systems at full collet stroke (trigger depressed and cutter ready to penetrate workpiece)

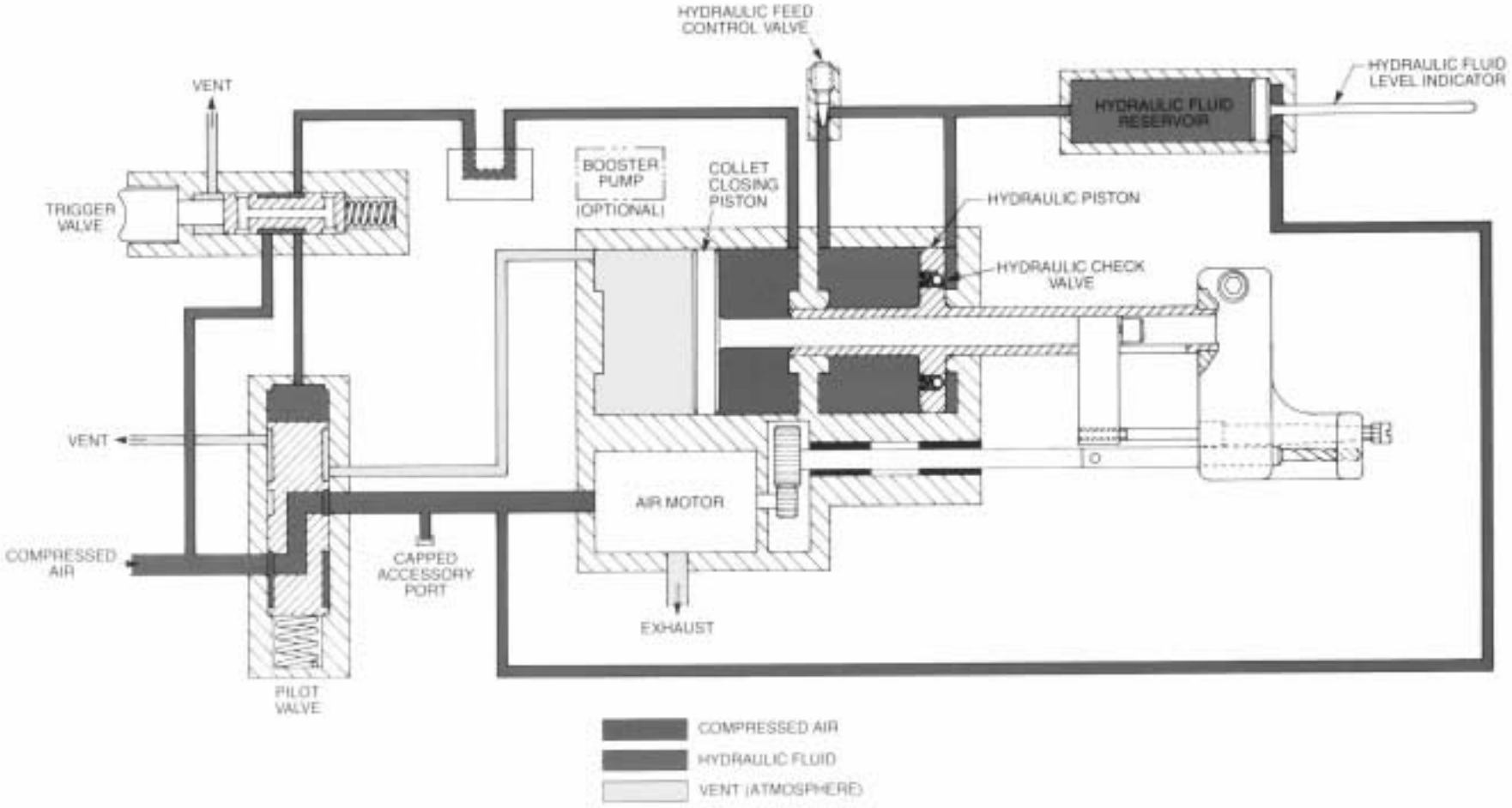


FIGURE 2.

3. Diagram of air and hydraulic systems at full drill feed stroke

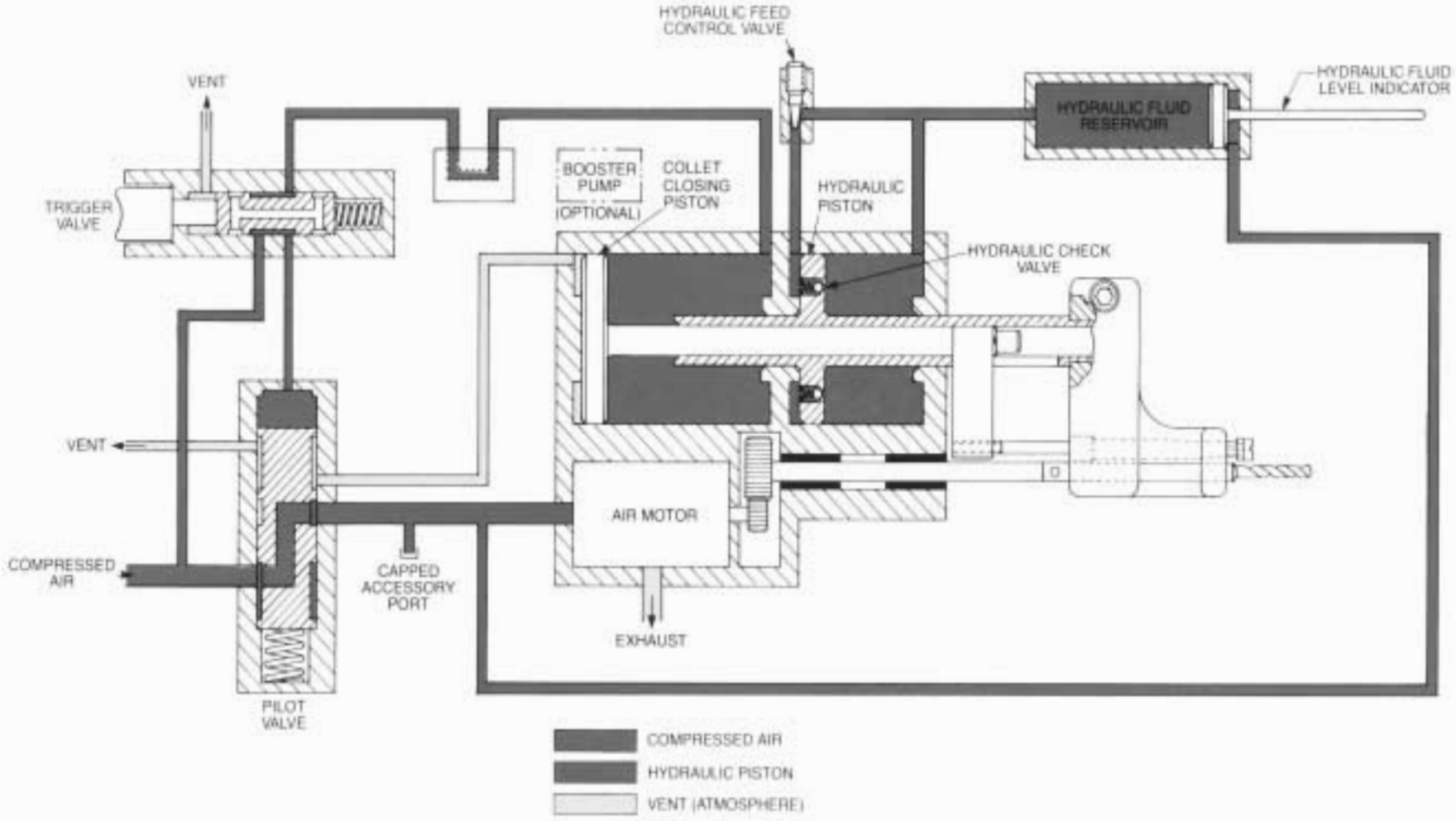
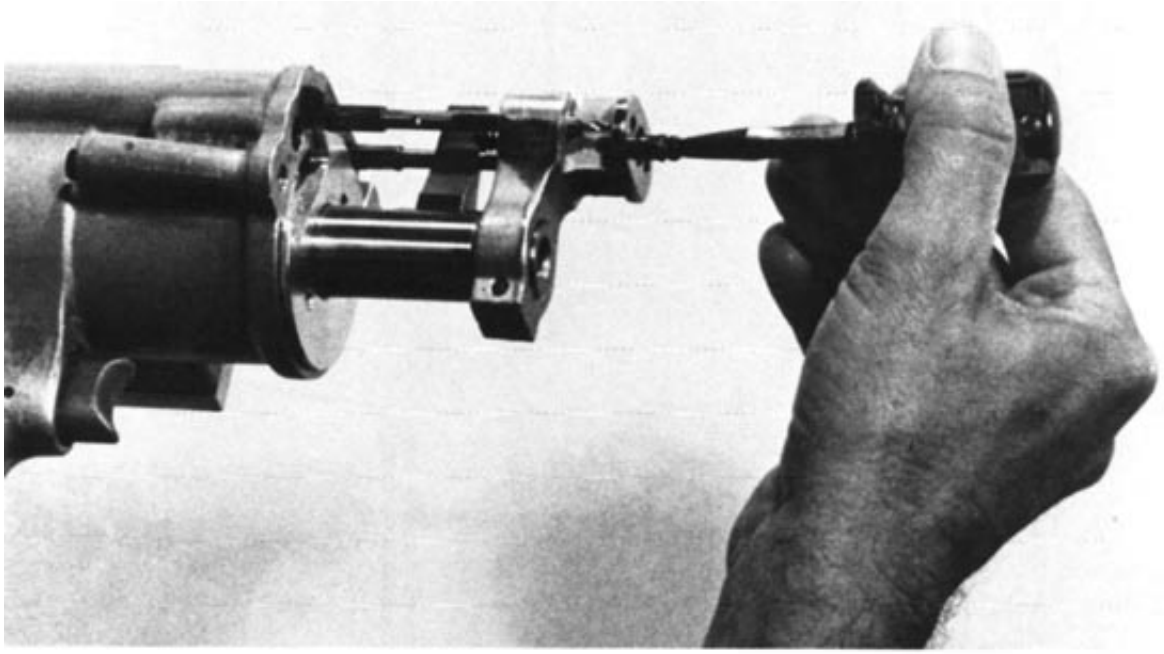


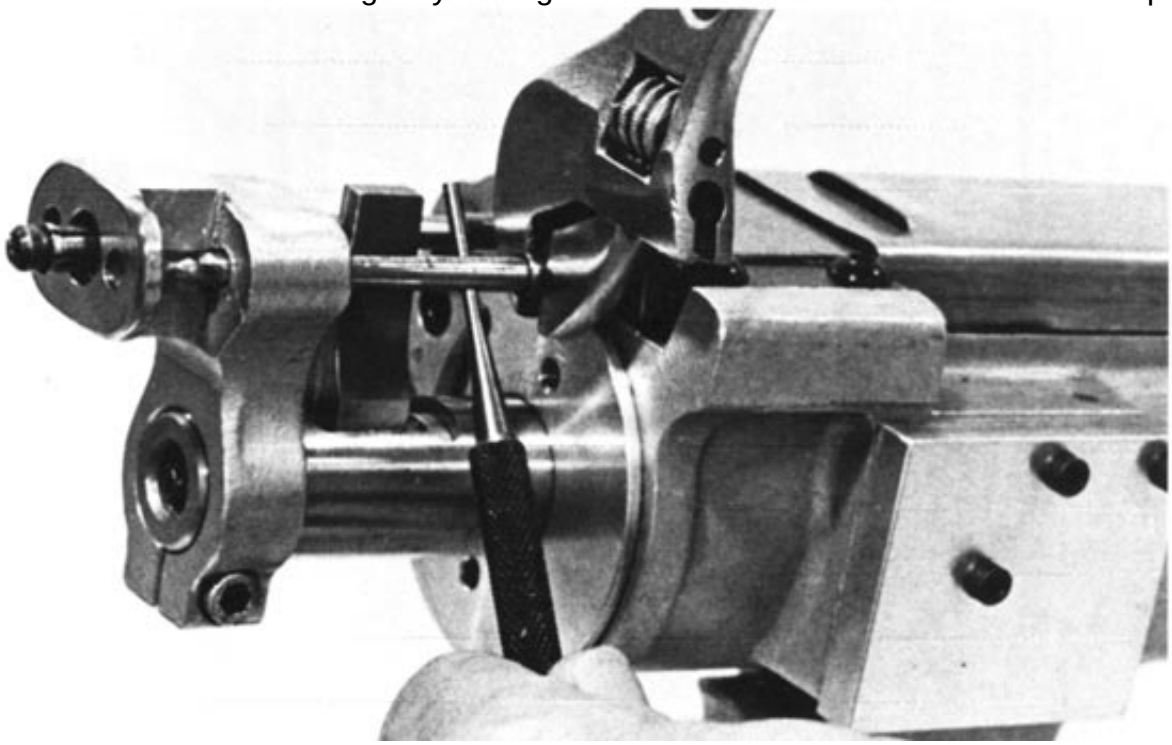
FIGURE 3.
FULL FEED STROKE

⚠ WARNING **DISCONNECT AIR SUPPLY BEFORE SERVICING. THE CLAMPING AND FEED MECHANISMS ARE EXPOSED.TO AVOID INJURY, KEEP FINGERS AND HANDS AWAY FROM THESE AREAS WHEN HANDLING OR OPERATING TOOLS.**

Pressure Foot Attachment/Disassembly



1. Remove mandrel from lift finger by turning counterclockwise then remove the collet spring.



2. Remove the drills from spindles by holding spindles with an adjustable wrench on the flats of the spindles. Insert pin-type tool into hole provided in drill shank and turn drill counterclockwise.

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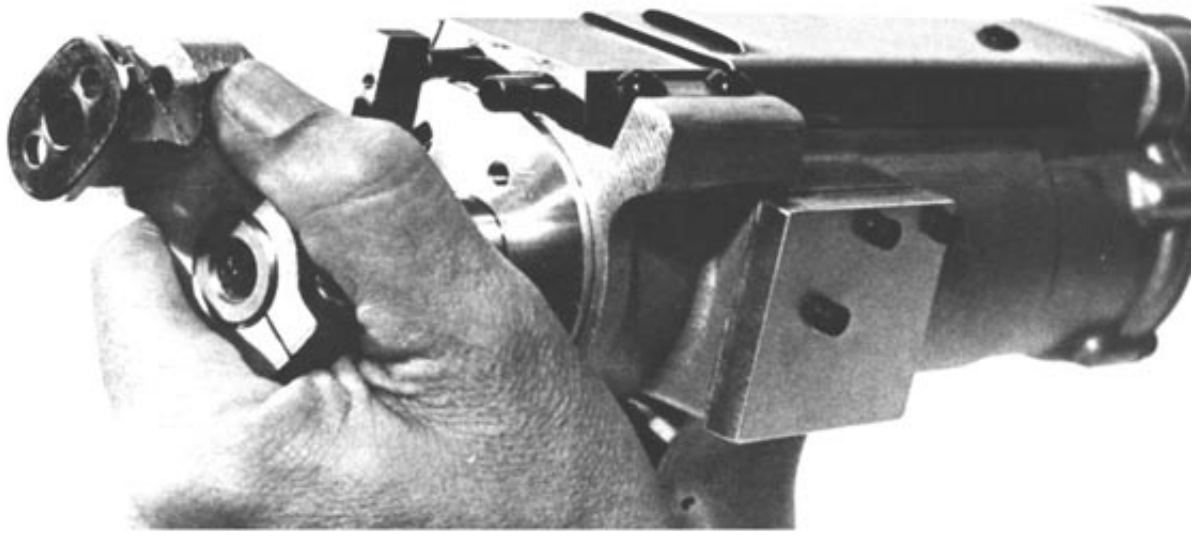
Pressure Foot Attachment/Disassembly — continued



3. Remove pressure foot by loosening clamp screw, then unscrew pressure foot attachment from collet closing piston rod.

4. Remove socket head cap screw 622060 from collet closing piston rod with hex wrench.

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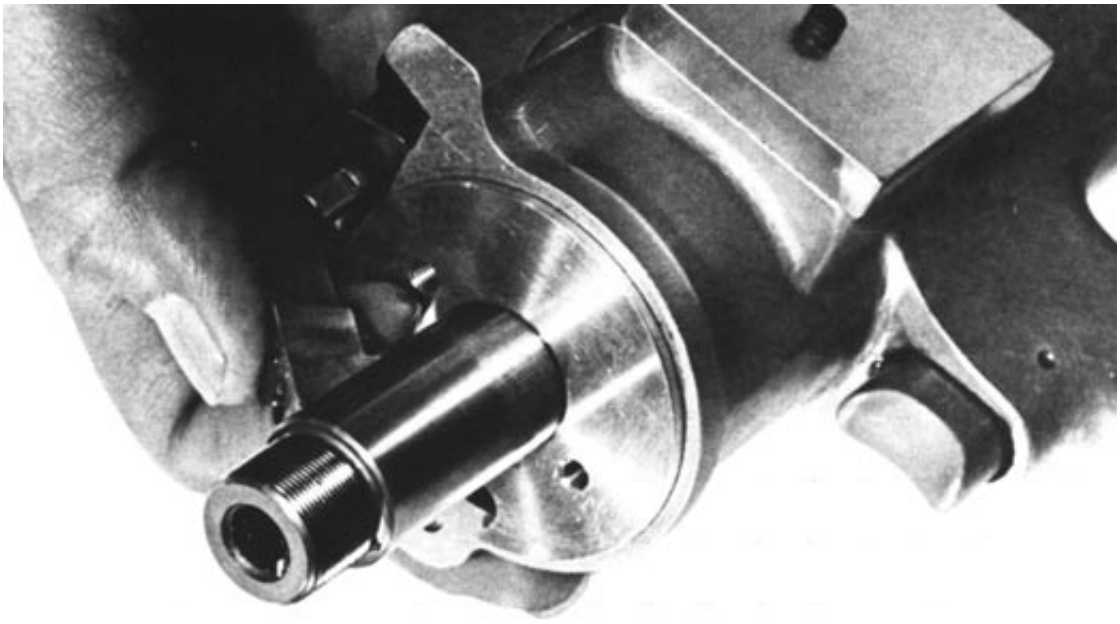
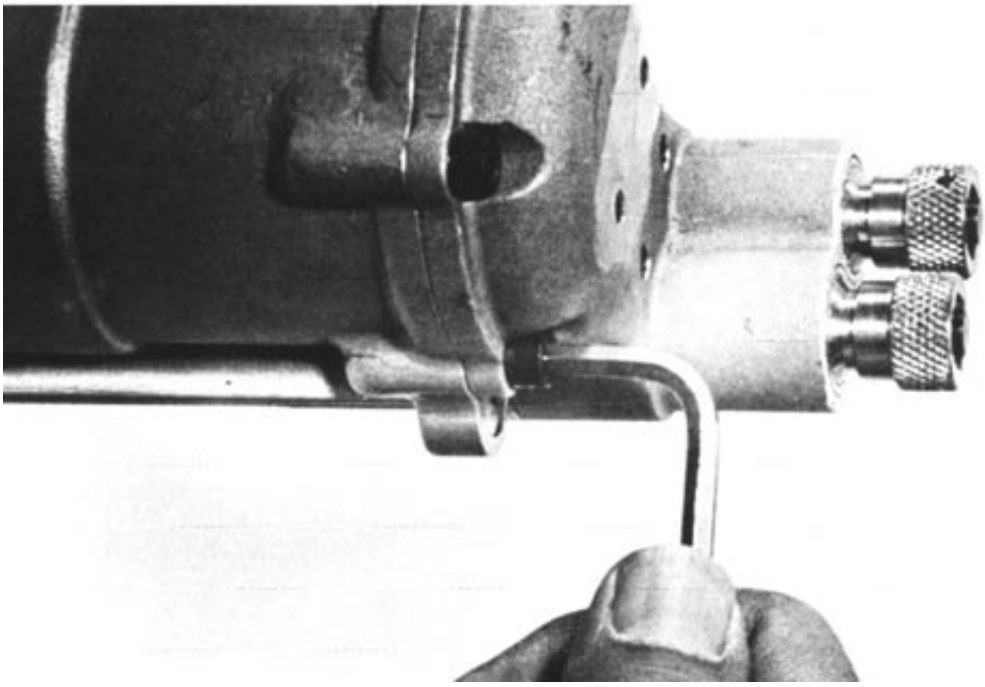
Pressure Foot Attachment/Disassembly — continued



5. Retract collet lift finger by applying pressure on the lift finger toward the tool. Remove lift finger from collet closing piston rod.

Spindle and Backhead Disassembly



1. Remove four socket head cap screws 863408 from backhead.

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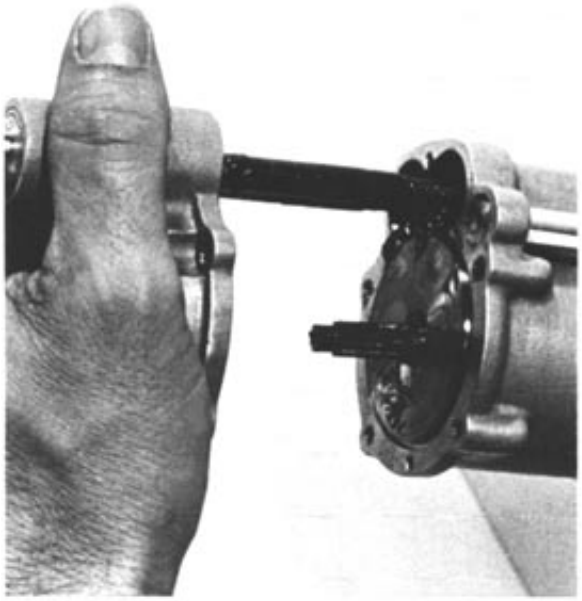
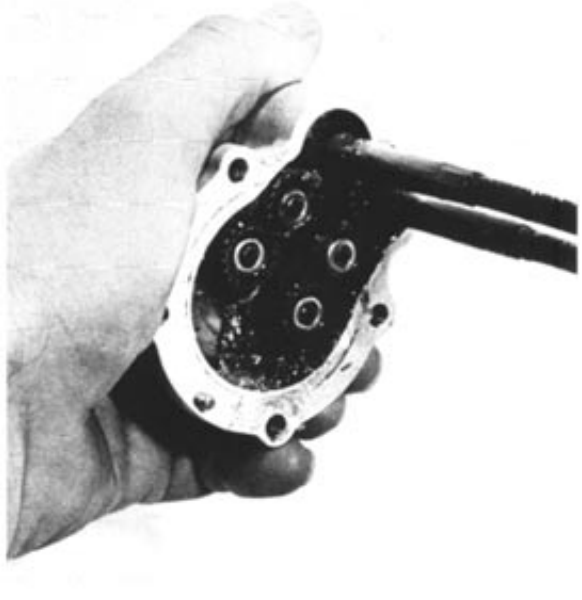
Spindle and Backhead Disassembly — continued





2. Remove backhead and spindle assemblies from motor housing. NOTE: Four idler gears are held in position by idler gear shafts in the backhead, and are retained by front bearing plate 622090. Front bearing plate remains in place in motor housing bore.

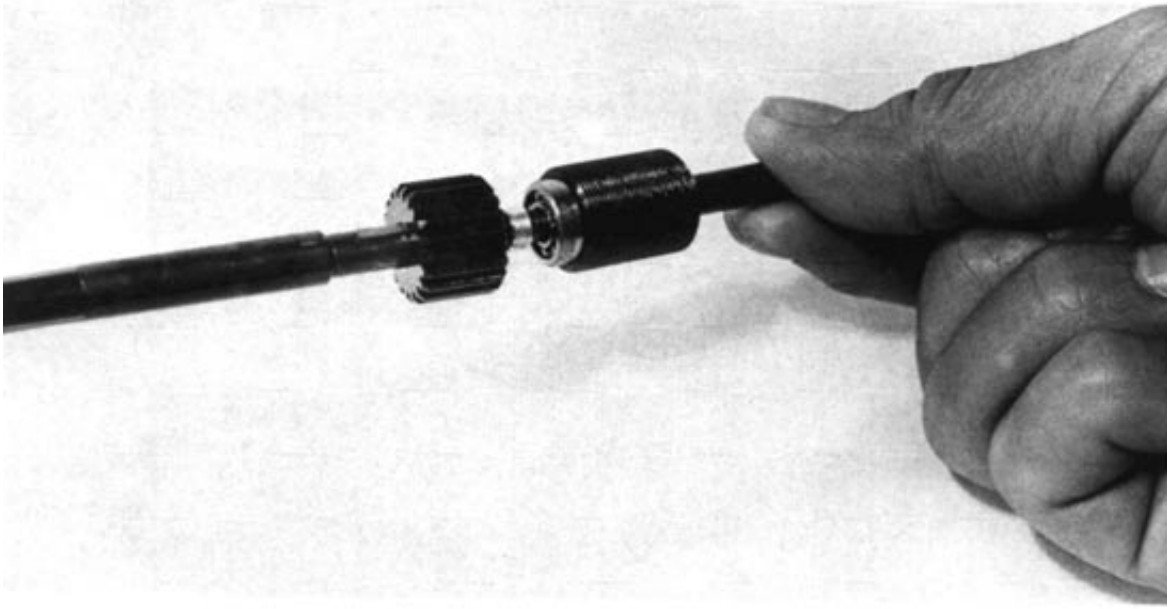
3. To remove spindles from backhead, use small punch to drive out roll pin 613162 in adjustment knob 622094. Removal of the roll pin releases the adjustment knob from the spindle adjustment screw 622093, the adjustment drive ring 622095 and spring 622140.

Spindle and Backhead Disassembly — continued

4. The spindle adjustment screw is removed by screwing the spindle clockwise through the backhead assembly 622091.

5. To remove spindle from spindle adjusting screw, remove retaining ring 623685 and insert end of spindle adjusting screw in vise. With a soft face hammer, tap spindle adjusting screw and pull spindle out.

Spindle and Backhead Disassembly — continued



6. Double row ball bearings 863582 are removed from spindle shaft by removing lock nut 623767 and driving shaft through bearings. To remove spindle gear 622097, remove retaining ring 833774 and slide spindle gear off shaft. Gear is held in place with key 622057. NOTE: Examine gears carefully for wear before reassembling tool. Replace if worn.

Spindle Support Plate and Spindle Cover Disassembly

Keep hands away from clamping and feed mechanisms. Clamp mechanism moves when drilling and connecting or removing air supply.
WARNING

1. Remove button head screw 812962 and 622063 from front and rear of spindle cover 622124.

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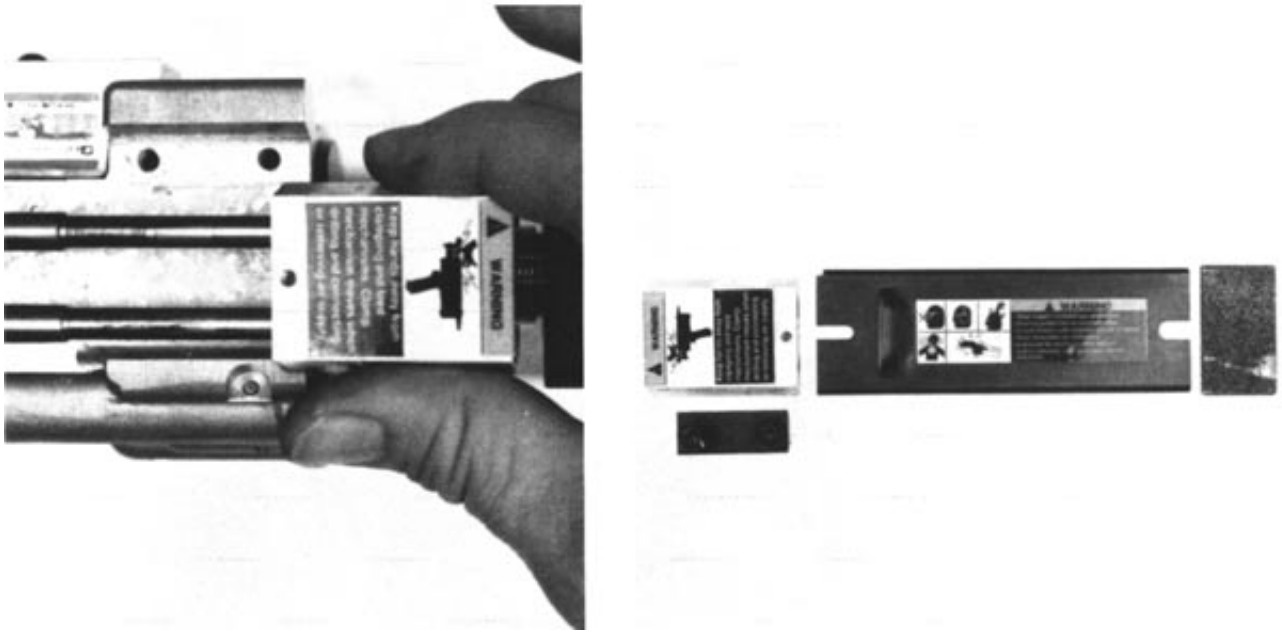
Spindle Support Plate and Spindle Cover Disassembly — continued

WARNING
Keep hands away from clamping and feed mechanisms. Clamp mechanism moves when drilling and connecting or removing air supply.

2. Remove two button head screws 622059 from spindle support wedge 622082.



3. Lift out support plate and spindle cover from motor housing. NOTE: The sintered bronze muffler should be periodically removed and washed in solvent.

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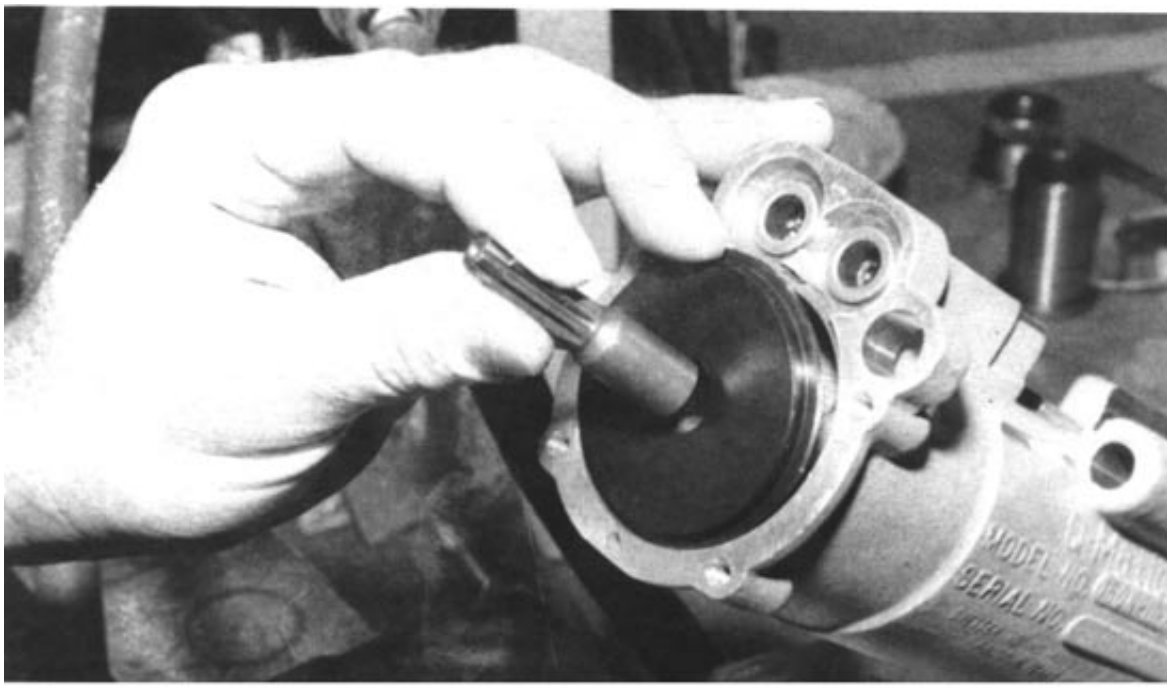
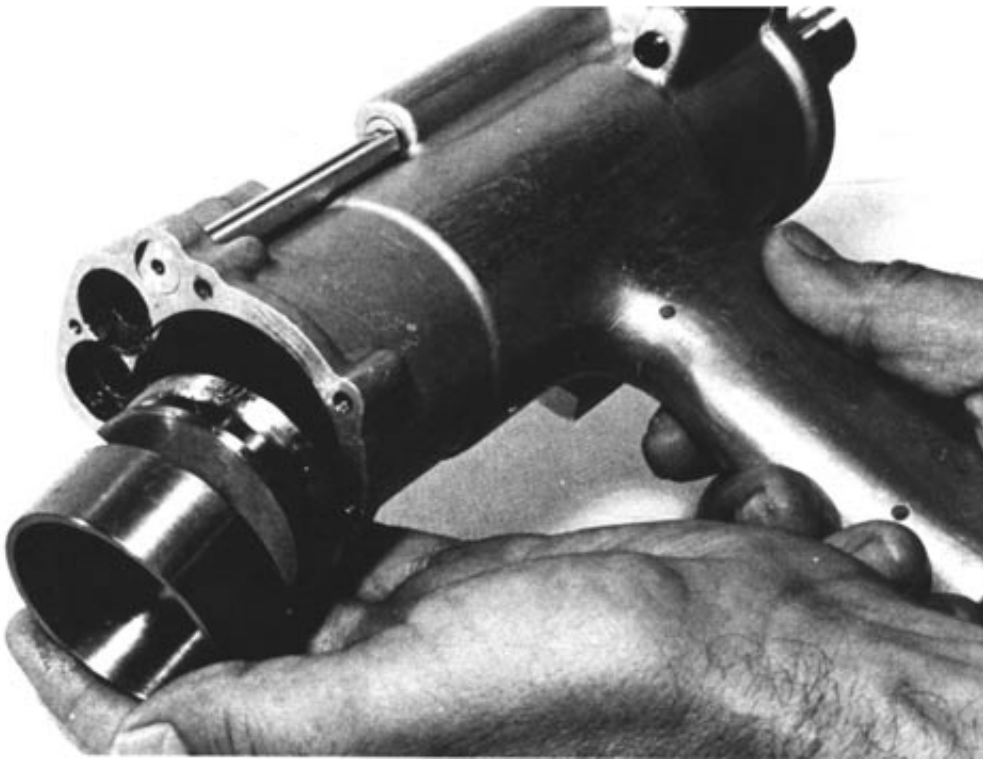
Air Motor Assembly Removal



1. Remove the gear plate 622101 and gear plate spacer 624354 (6,000 & 20,000 RPM tools only) from rear of motor housing.



2. Tap motor housing gently on table top to drop motor assembly out of housing.

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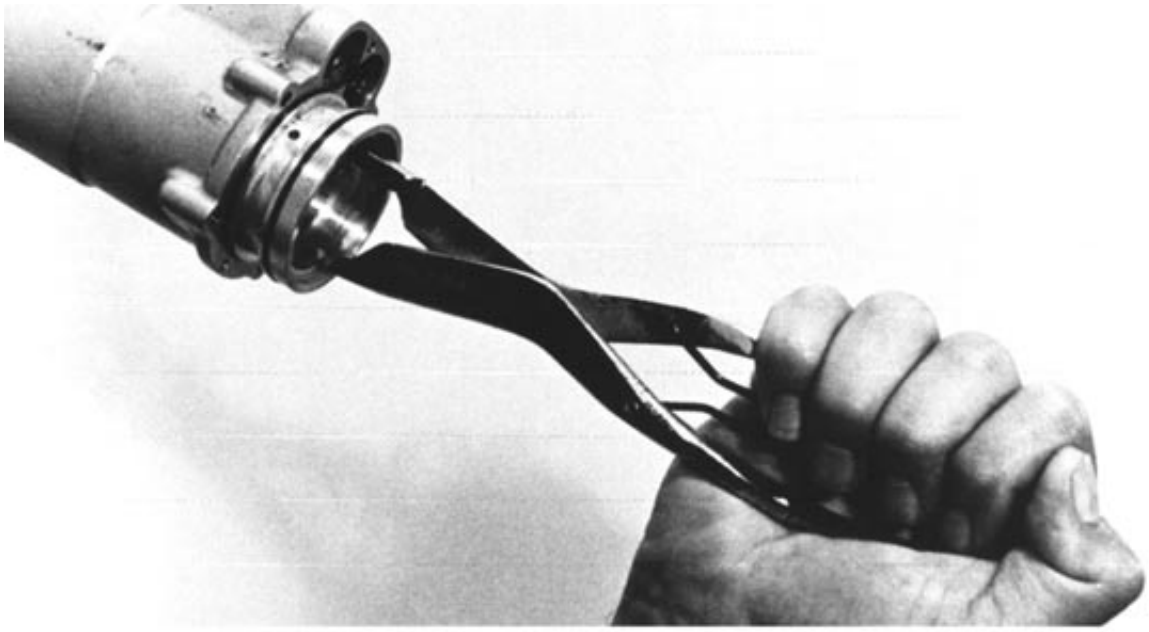
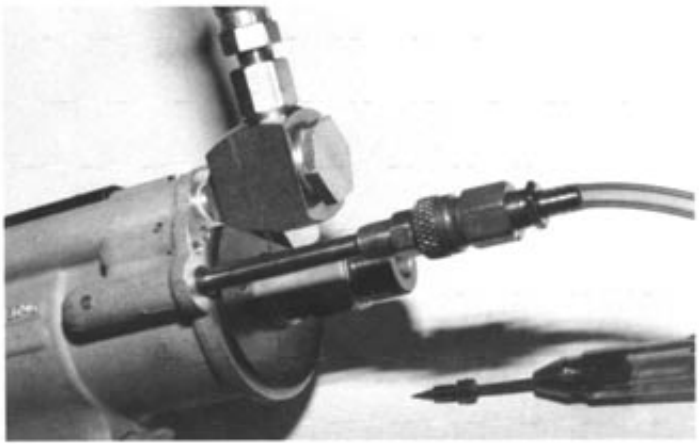
Air Motor Assembly Removal — continued



3. Rear bearing support is removed by tapping the motor housing on cushioned bench top. The rear bearing support can also be removed using special internal grip pliers as shown in photo.

Hydraulic System Bleeding and Filling Procedure



Attach hydraulic bleed unit to hydraulic fill fitting using hydraulic fitting coupler 622871. Remove feed control needle valve 622026 and screw in circulating line. Attach air line to tool and turn on air. Turn on circulating pump to circulate fluid. Depress trigger on tool several times to remove air. Visually check circulating line for air bubbles. Check fluid indicator to see if tool is full of fluid. Turn off circulating pump and disconnect hydraulic fitting coupler 622871 NOTE: Do not damage spindles when disconnecting coupler. Disconnect circulating line and replace feed control needle valve 622026. NOTE: If tool "lunges" during operation, it is due to trapped air. Repeat bleed procedure described above.

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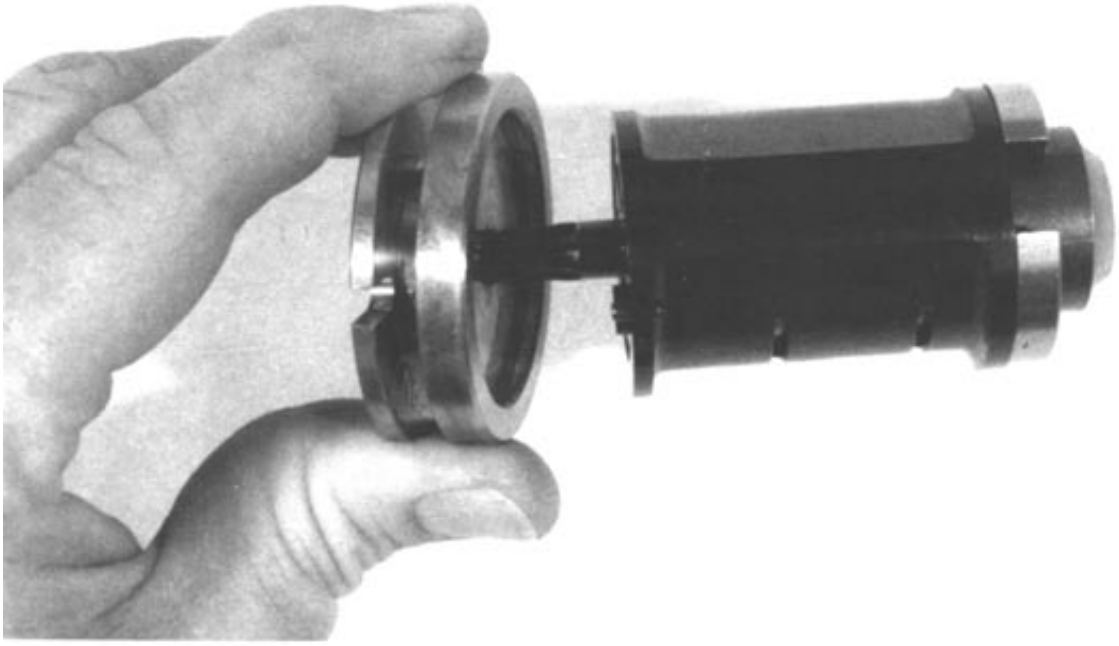
Air Motor Assembly Disassembly



1. Lift front bearing plate 622090 from alignment pin 812164.

2. Unscrew button head screw 615641 from rotor to remove rear bearing plate 864232. Remove rotor 622089 from cylinder 864236. Use small flat blade screwdriver to pry up bearing cap 864335. Four rotor blades will fall out. NOTE: When reassembling rotor blades in rotor slots, the straight edge of blade should be aligned with the outside diameter of the rotor.

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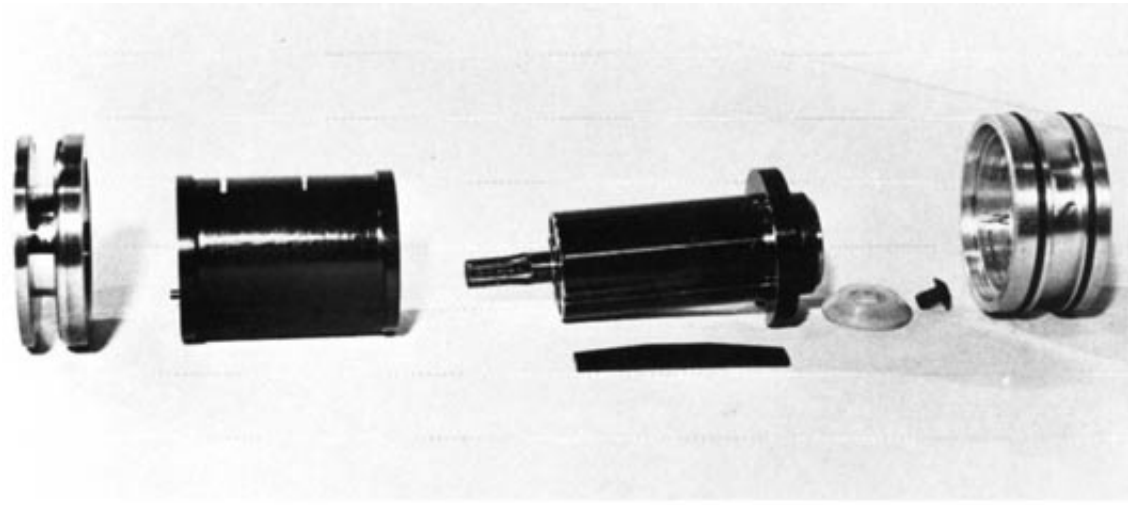
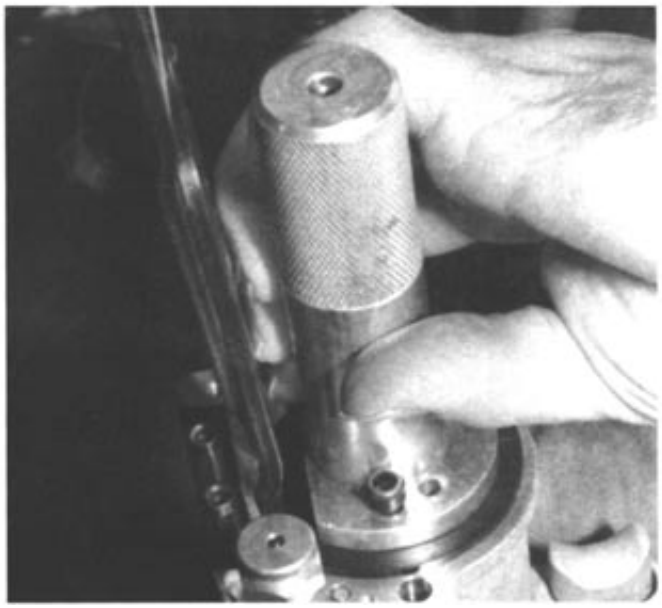
Air Motor Assembly Disassembly — continued



3. Air motor assembly components.

Feed and Clamp Cylinder Piston Disassembly



1.Using assembly tool 623334 for removing and installing front enclosure 624290 and two 10-32 screws, remove retaining ring 622061 with pliers and lift out front enclosure bulkhead.

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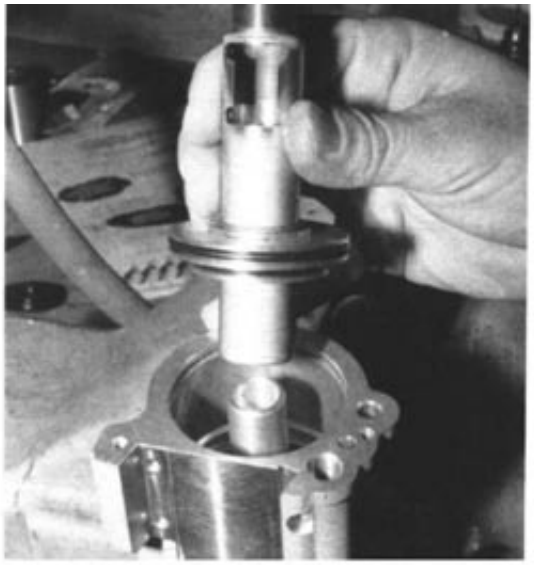
Feed and Clamp Cylinder Piston Disassembly — continued

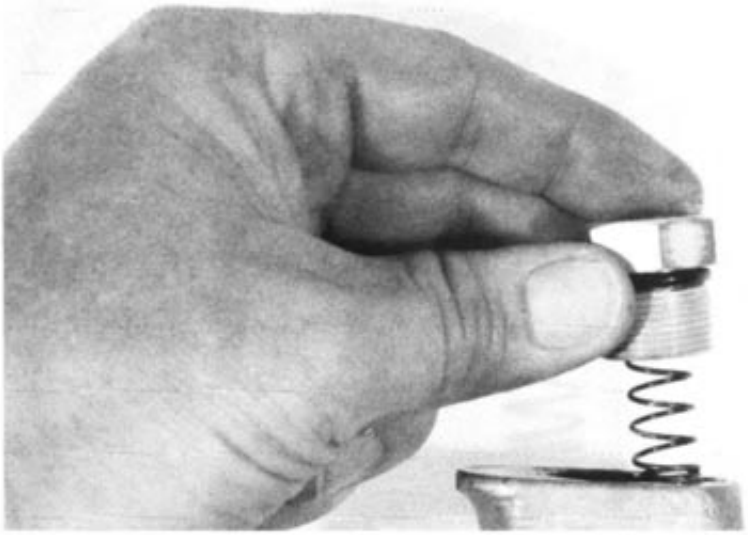


2. Remove clamp feed shaft 622072 and piston 622070.

3. Remove retainer ring 622065. Using assembly tool 623334 and two 8-32 screws remove pressure head 624289.

⚠ WARNING **DISCONNECT AIR SUPPLY BEFORE SERVICING. THE CLAMPING AND FEED MECHANISMS ARE EXPOSED.TO AVOID INJURY, KEEP FINGERS AND HANDS AWAY FROM THESE AREAS WHEN HANDLING OR OPERATING TOOLS.**

Main Air Valve Assembly Removal



1. Set handle in vertical position and remove inlet bushing 622080, then lift out main air valve spring 622141.

2. Insert 8-32 screw into pilot spool 622007 and lift out pilot sleeve spacer 622081. Remove spool and pilot sleeve. Main air valve assembly components are shown on right.

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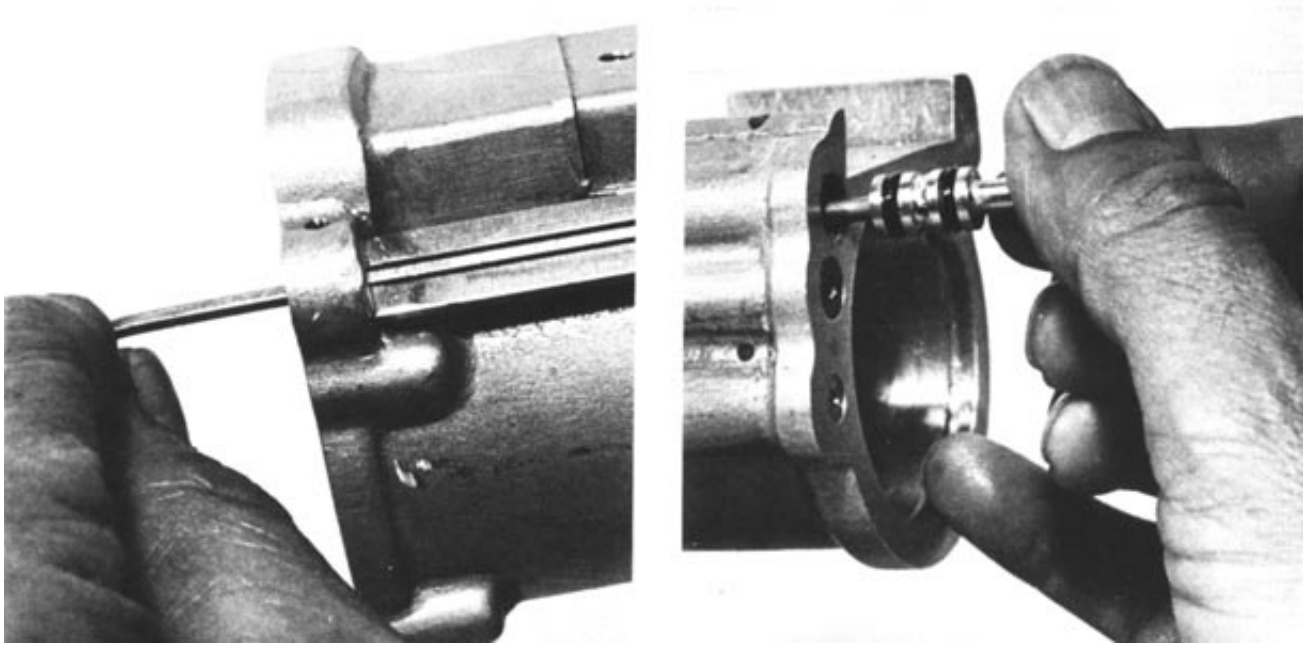
Fluid Reservoir Assembly Removal

1. Remove hydraulic fill fitting 621762 from front of reservoir.



2. Insert small dowel against reservoir gage 622084 and push fluid reservoir gage through front of opening.

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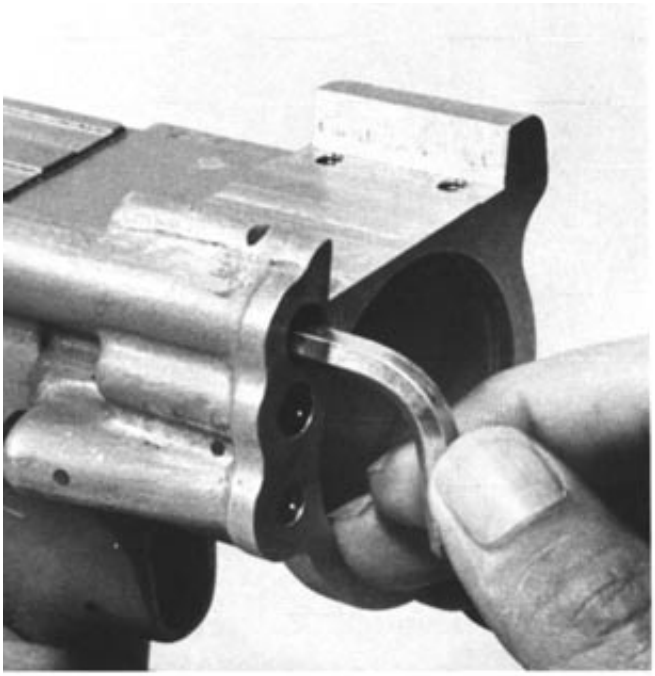
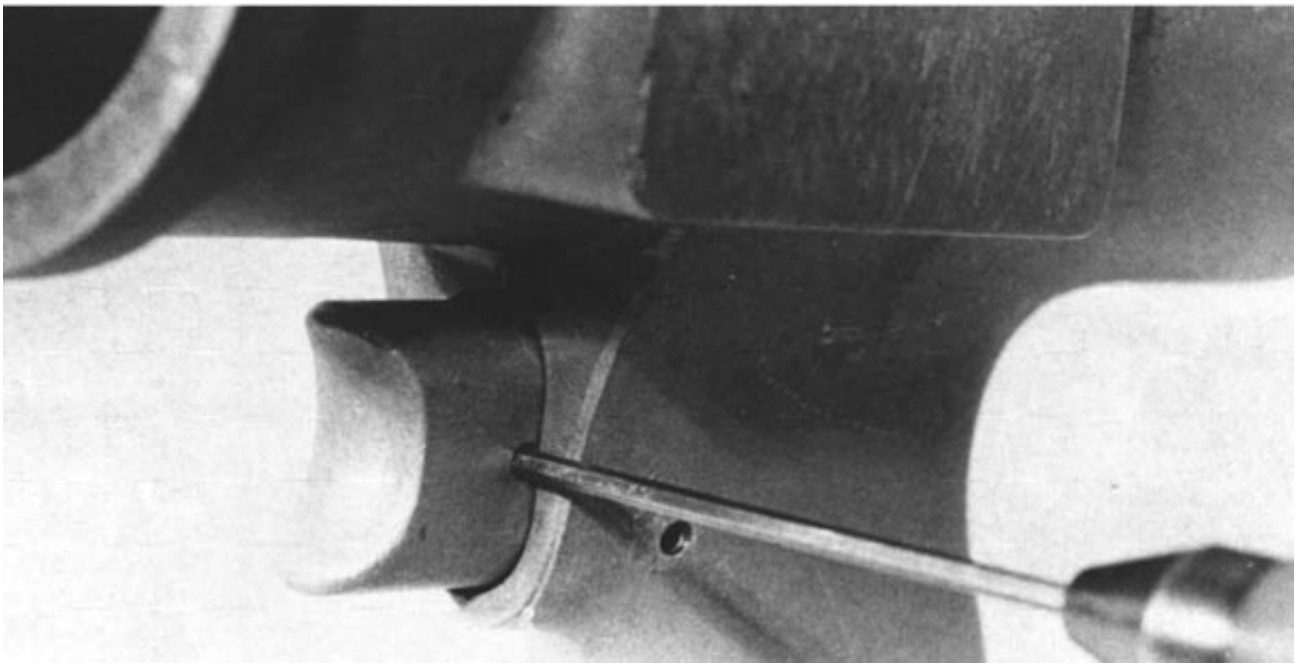
Fluid Reservoir Assembly Removal — continued



3. Push gage tube guide with dowel through front opening and remove from rear of housing. NOTE: Always replace with new O-rings.

Trigger Assembly Removal



1. Remove set screw 622054 from trigger 622073 and pull trigger spool out of trigger spool 623691.

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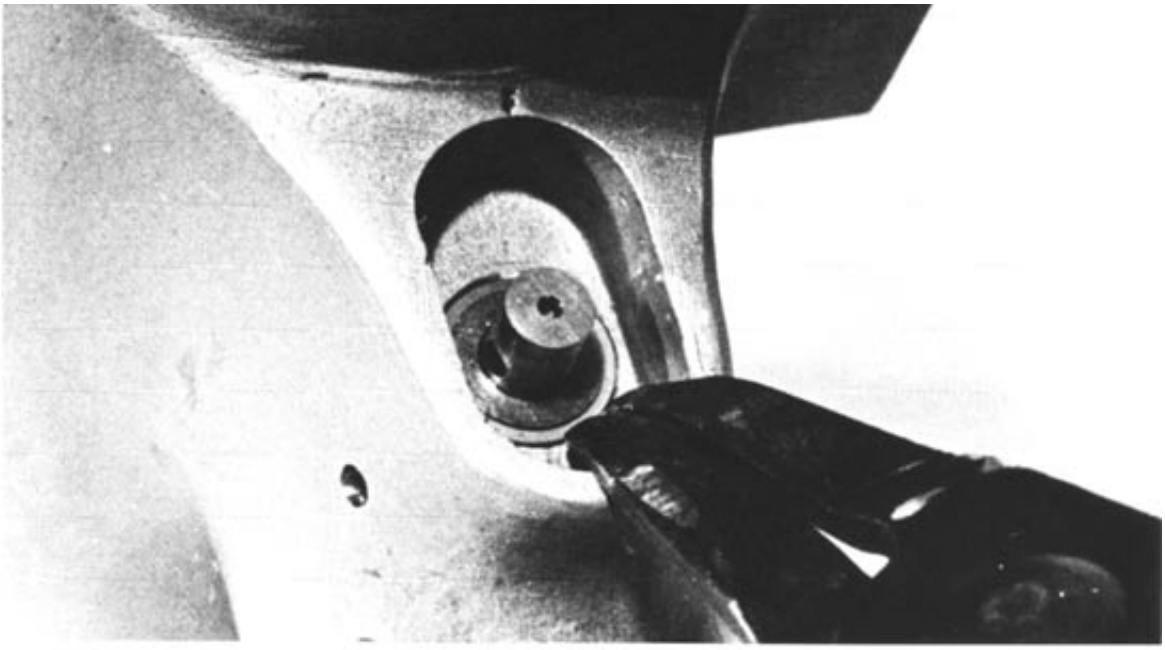
Trigger Assembly Removal — continued



2. Remove snap ring 864271 and pull trigger sleeve and trigger spool 623691 out of base.

3. Remover trigger return spring 622088 from bottom of trigger bore. Trigger assembly components.

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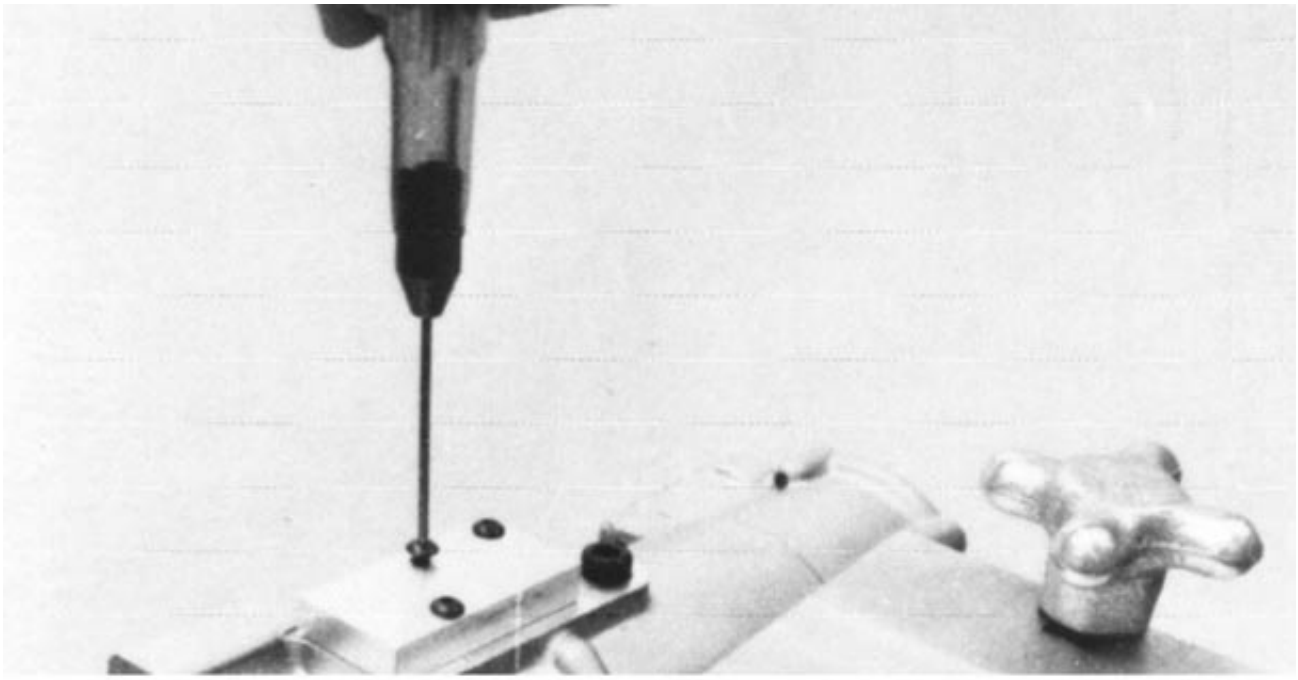
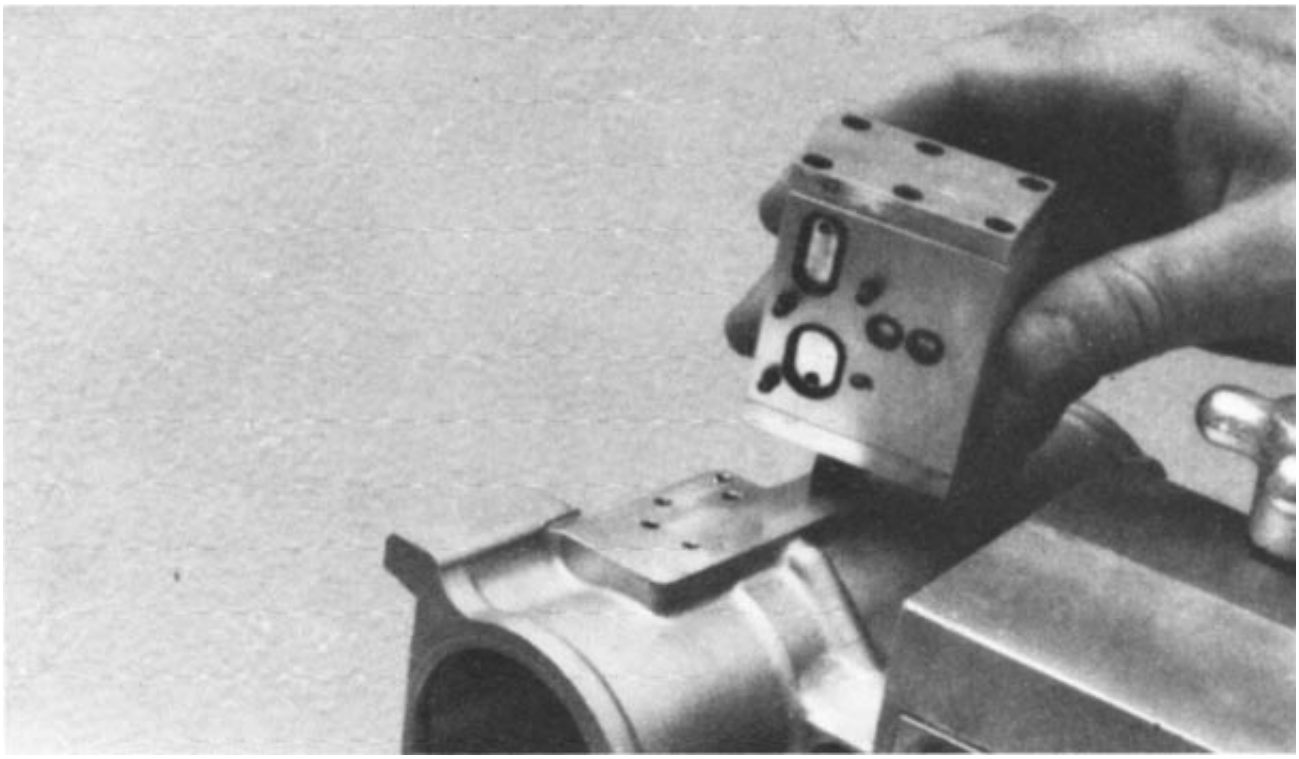
Mounting Air Booster Pump



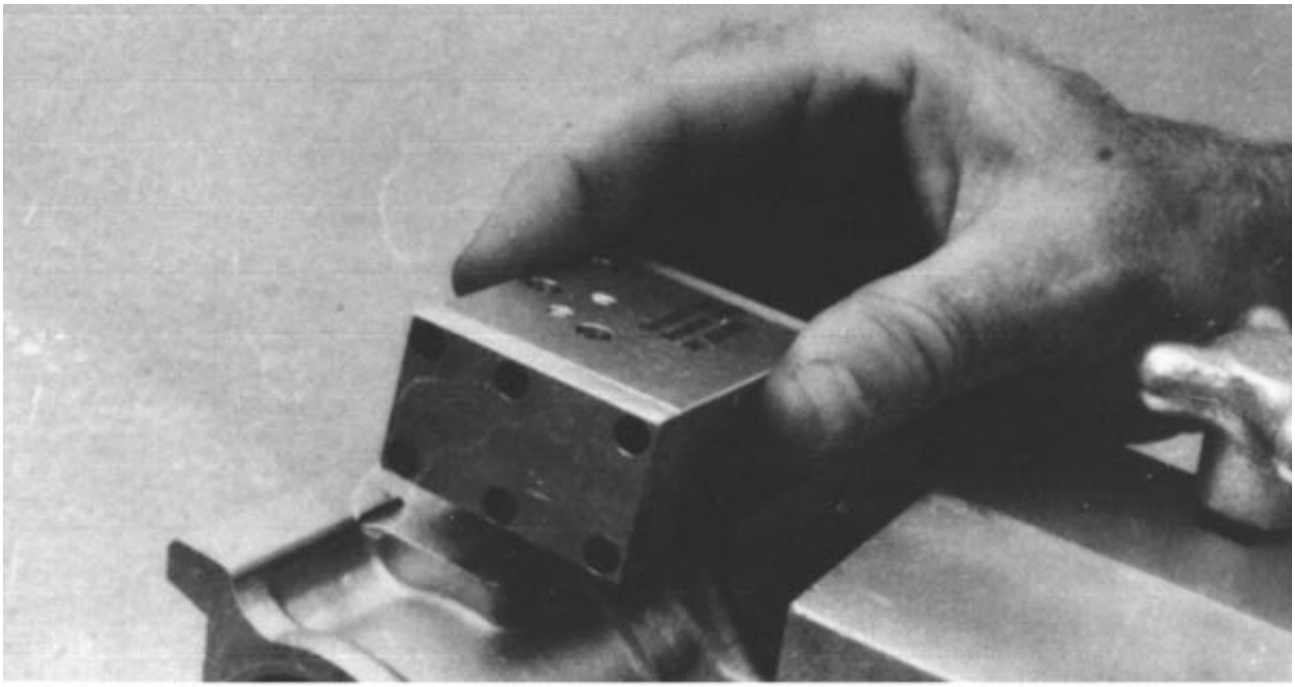
1. To install optional air booster pump, remove the comer plate 621439 by unscrewing three button head screws 622053.



2. Mount optional air booster pump assembly 621482 with three socket head cap screws and O-rings supplied with air booster pump kit.

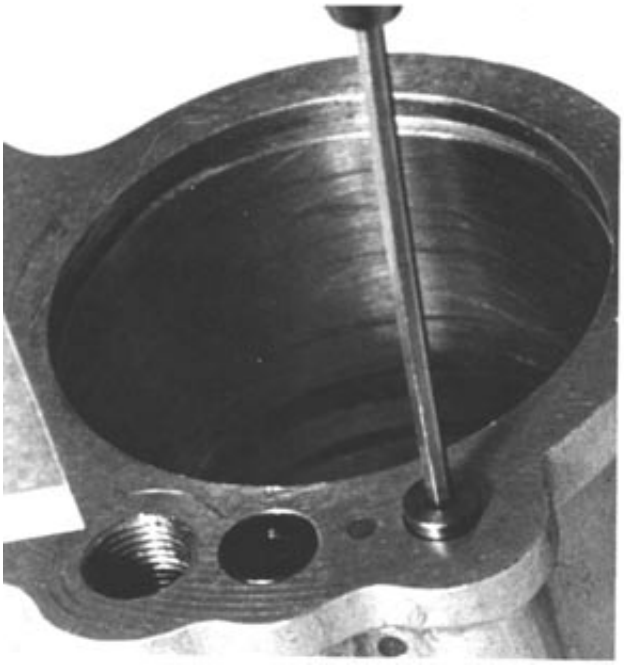
⚠ WARNING **DISCONNECT AIR SUPPLY BEFORE SERVICING. THE CLAMPING AND FEED MECHANISMS ARE EXPOSED.TO AVOID INJURY, KEEP FINGERS AND HANDS AWAY FROM THESE AREAS WHEN HANDLING OR OPERATING TOOLS.**

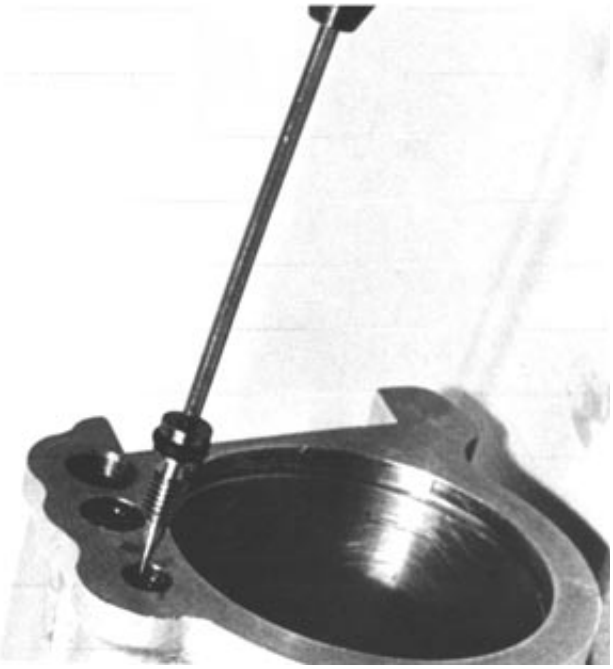
Mounting Air Booster Pump — continued



3. NOTE: The booster pump is recommended for use only in the 600 rpm model tool.

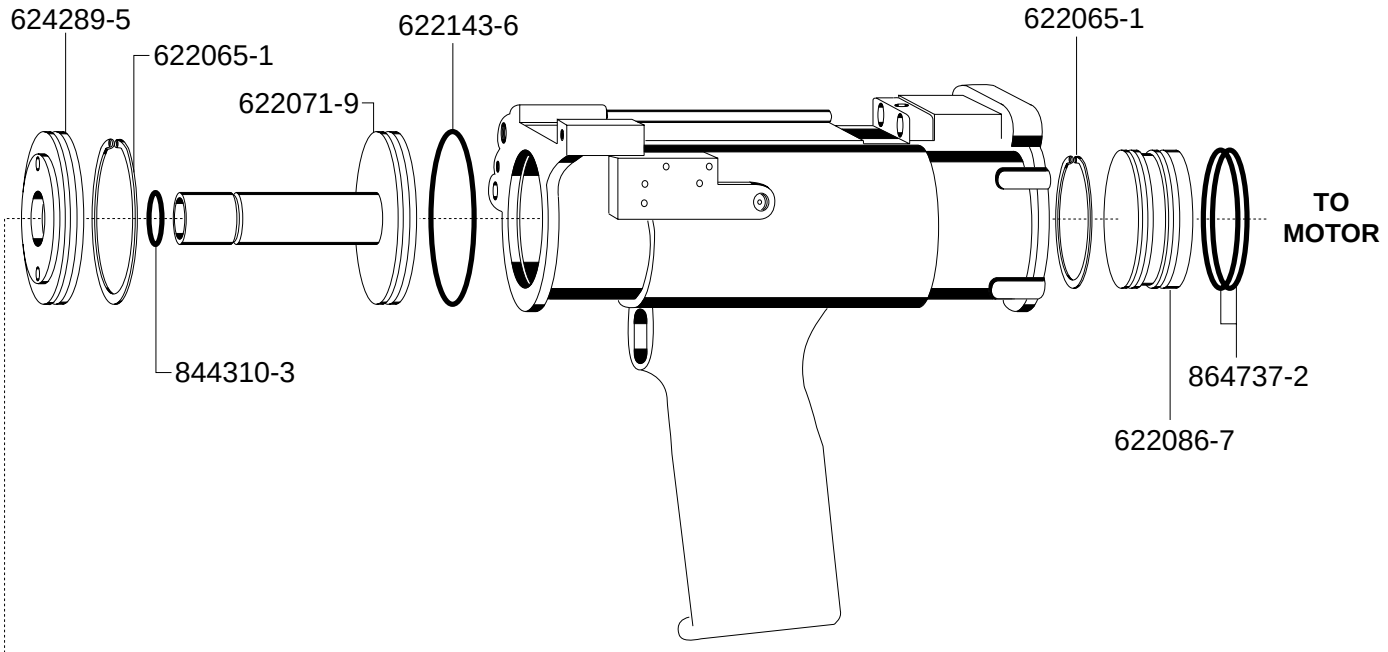
Feed Control Valve Removal

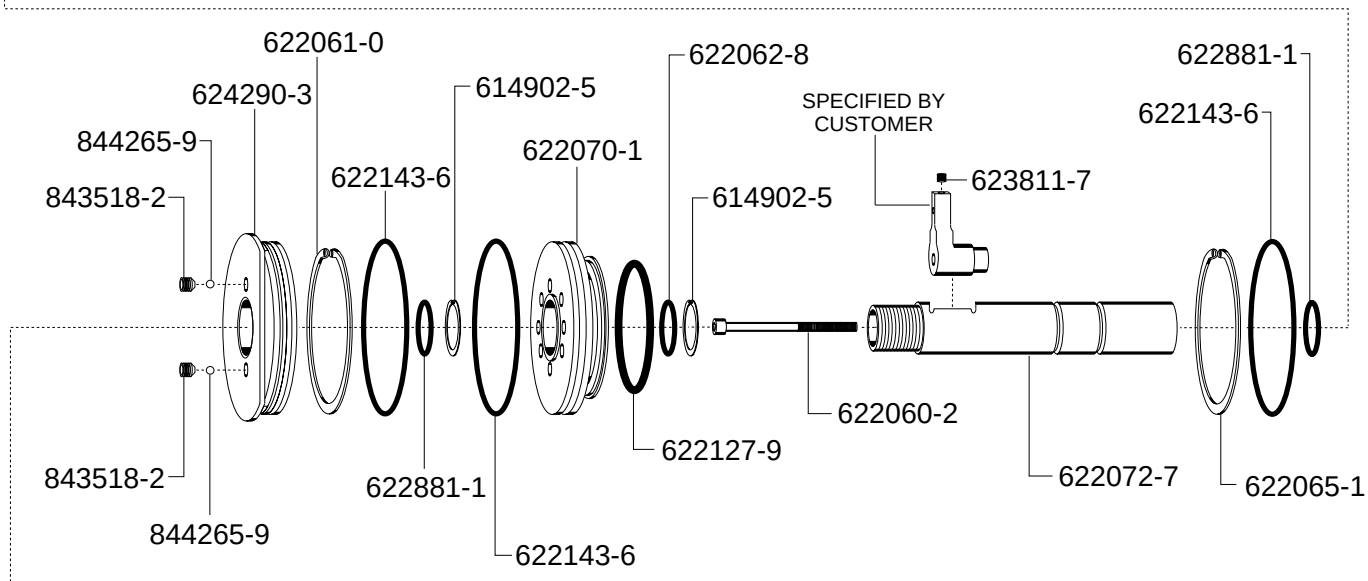


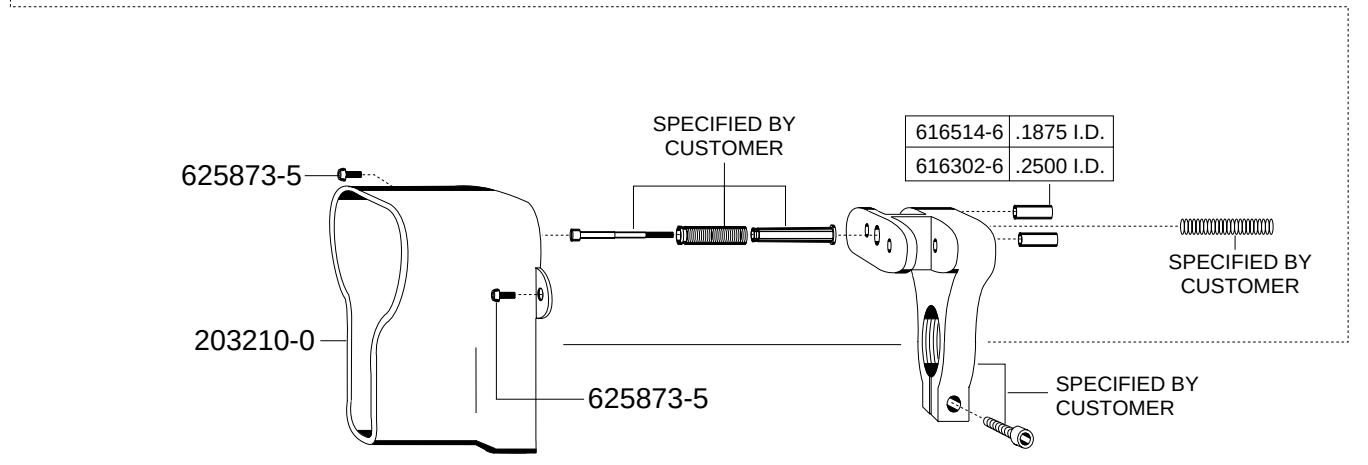


1. Using hex wrench, unscrew feed control needle valve part 622026. Remove from housing and replace O-ring 844301 to insure positive seal.

CLAMPING ASSEMBLY



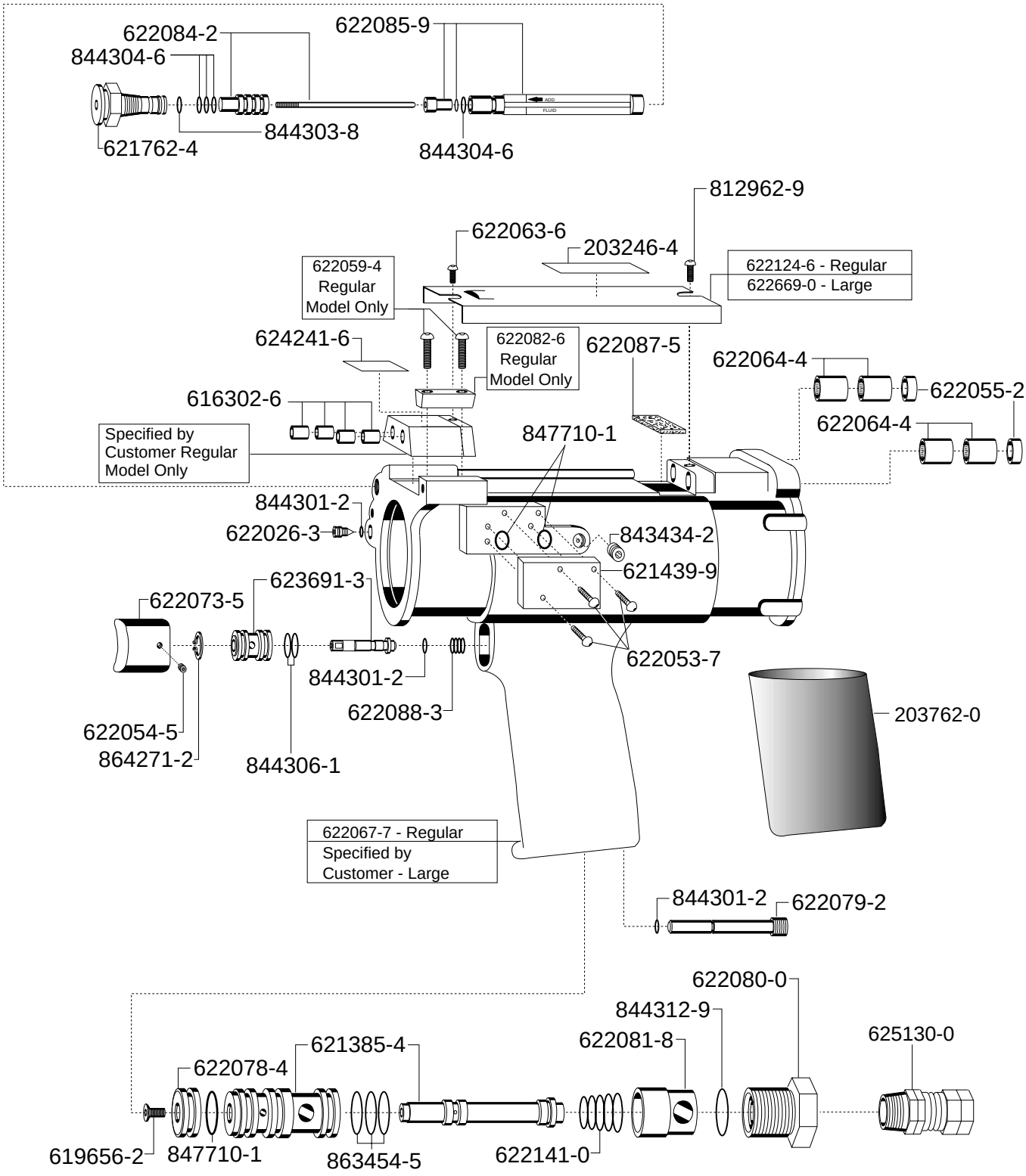




CLAMPING ASSEMBLY PARTS LIST

MODEL NO.	NAME OF PART	QTY.
203210-0	Foot Guard	1
614902-5	Piston Retainer Ring	2
616302-6	Pressure Foot Bushing .2500 I.D.	2
616514-6	Pressure Foot Bushing .1875 I.D.	2
622060-2	Lift Finger Screw	1
622061-0	Front Enclosure Retainer Ring	1
622062-8	"O"-Ring 13/16" x 1-1/16"	1
622065-1	Pressure Head Retainer Ring	3
622070-1	Piston	1
622071-9	Collet Piston	1
622072-7	Clamp Feed Shaft	1
622086-7	Rear Bearing Plate Support	1
622127-9	"O"-Ring 1-3/8" x 1-9/16"	1
622143-6	"O"-Ring 1-13/16" x 2"	3
622881-1	"O"-Ring 55/64" x 1-9/64"	2
623811-7	Set Screw	1
624289-5	Pressure Head	1
624290-3	Front Enclosure	1
625873-5	Foot Guard Screw	2
843518-2	Front Enclosure Set Screw	2
844265-9	Front Enclosure Ball (1/8" Dia.)	2
844310-3	"O"-Ring 1/2" x 11/16"	1
864737-2	"O"-Ring 1-7/8" x 2"	2

HANDLE ASSEMBLY



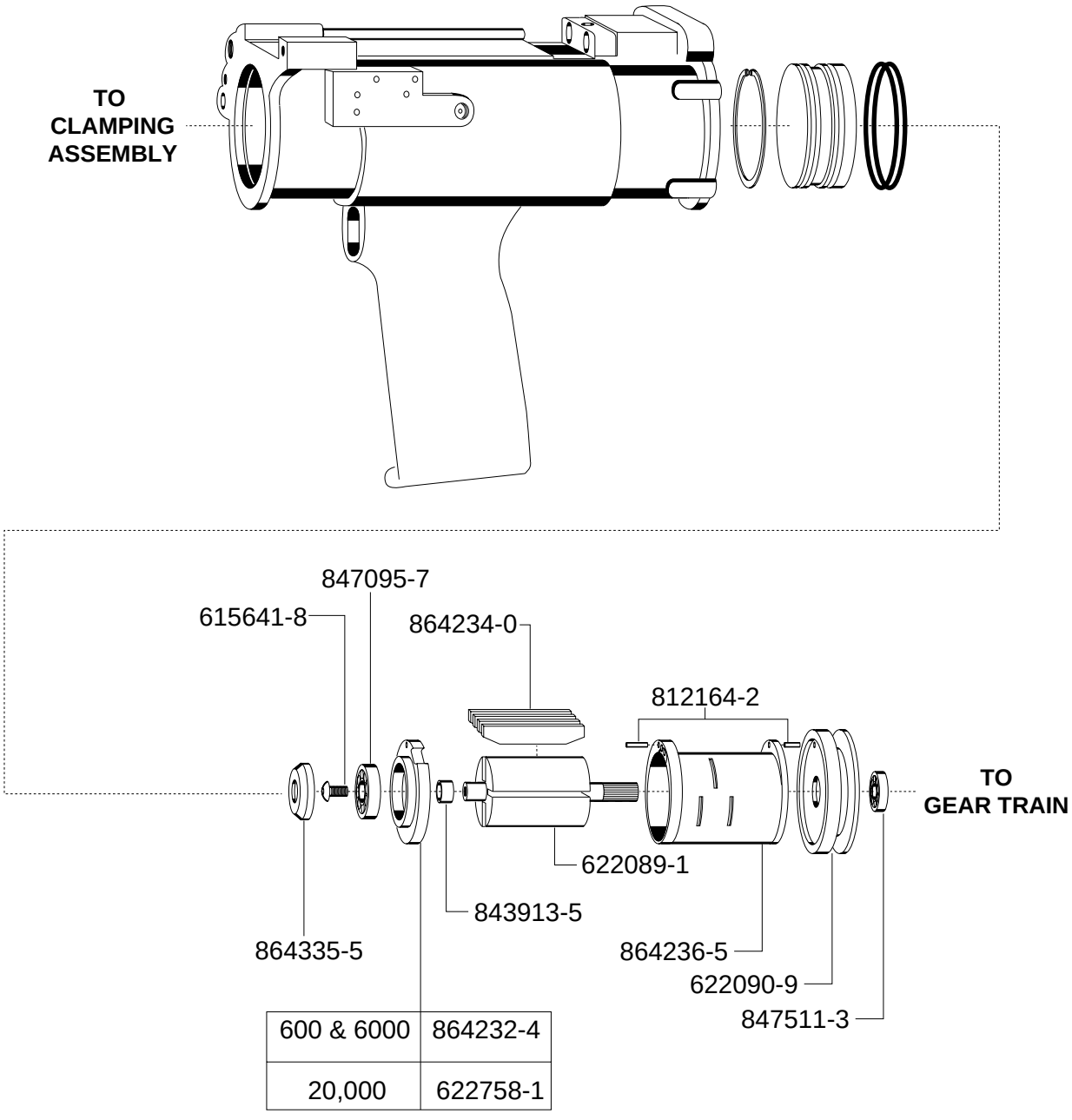
HANDLE ASSEMBLY PARTS LIST

MODEL NO.	NAME OF PART	QTY.
203246-4	Warning Label	1
203762-0	Grip Sleeve	1
616302-6	Support Block Bushing	4
619656-2	Shift Piston Screw	1
621385-4	Pilot Valve Assembly	1
621439-9	Cover Assembly	1
621762-4	Filler Check Assembly (includes 844303, 844304)	1
622026-3	Needle Valve	1
622053-7	Cover Assembly Screw	3
622054-5	Trigger Set Screw	1
622055-2	Spindle Thrust Bushing (included in 622067)	2
622059-4	Support Wedge Screw	2
622063-6	Spindle Cover Screw (Small)	1
622064-4	Spindle Needle Bearing (included in 622067)	4
622067-7	QNPD-D Handle (includes 622055, 622064)	1
622073-5	Trigger	1
622078-4	Shift Piston	1
622079-2	Adjustment Screw	1
622080-0	Inlet Bushing	1
622081-8	Pilot Sleeve Bushing	1
622082-6	Support Wedge	1
622084-2	Reservoir Gage	1
622085-9	Gage Tube Guide	1
622087-5	Muffler Pad	1
622088-3	Trigger Spring	1
622124-6	Spindle Cover (QNPD-D)	1
622141-0	Inlet Spring	1
622669-0	Spindle Cover (QNPD-D)	1
623691-3	Trigger Valve Assembly	1
624241-6	Warning Label	1
625130-0	Swivel Fitting Coupler	1
812962-9	Spindle Cover Screw (Large)	1
843434-2	Handle Pipe Plug	1
844301-2	"O"-Ring 1/8" x 1/4"	3
844303-8	"O"-Ring 3/16" x 5/16"	3
844304-6	"O"-Ring 7/32 x 11/32"	4
844306-1	"O"-Ring 5/16" x 7/16"	2
844312-9	"O"-Ring 5/8" x 11/16"	1
847710-1	"O"-Ring 1/2" x 5/8"	3
863454-5	"O"-Ring 9/16" x 11/16"	3
864271-2	Trigger Snap Ring	1

OPTIONAL ACCESSORY

HYDRAULIC FITTING COUPLER ~~6~~22871-2

MOTOR ASSEMBLY



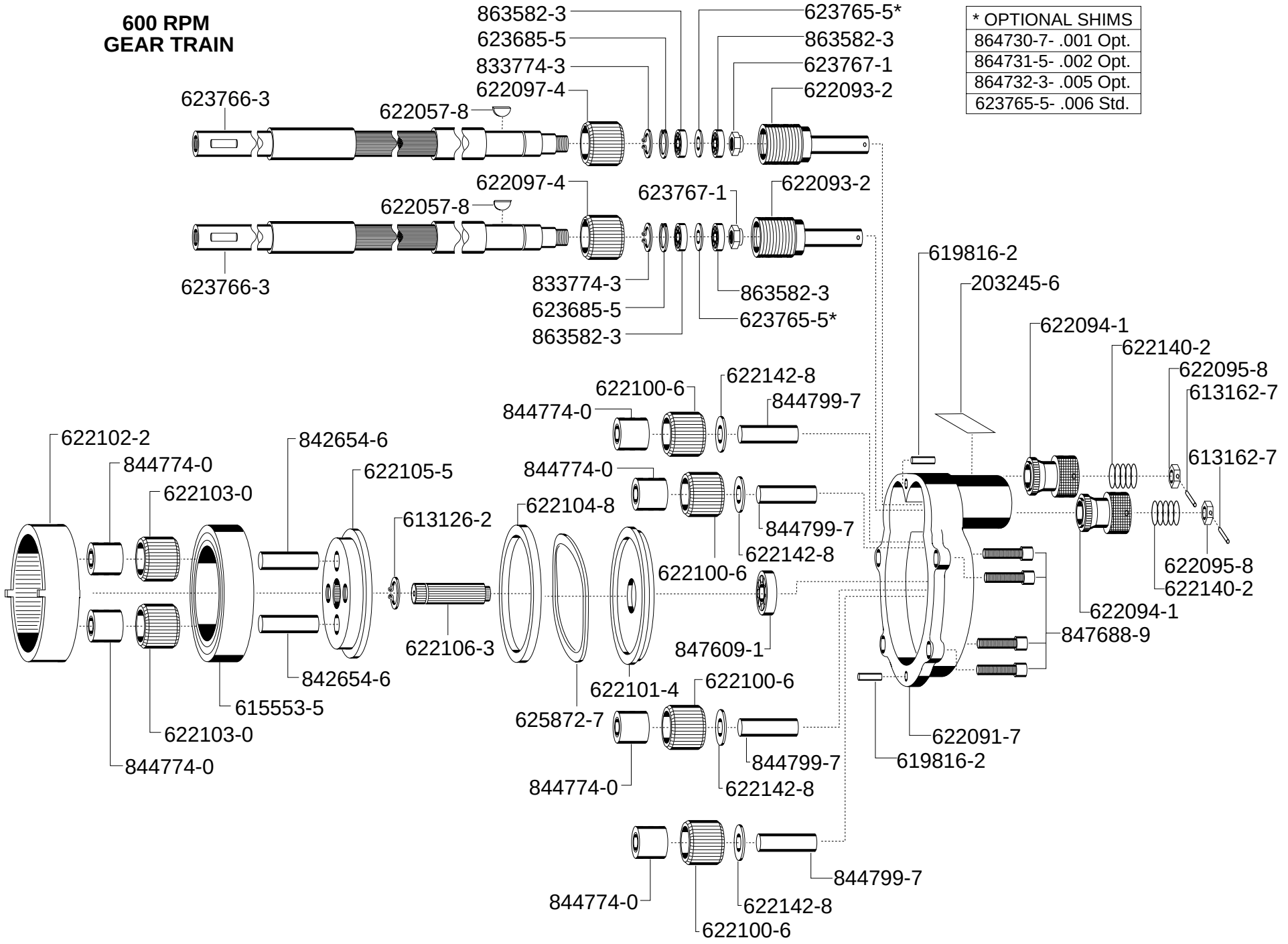
600 & 6000	864232-4
20,000	622758-1

MOTOR ASSEMBLY PARTS LIST

MODEL NO.	NAME OF PART	QTY.
615641-8	Rear Bearing Retainer Screw	1
622089-1	Rotor	1
622090-9	Front Bearing Plate	1
622758-1	Rear Bearing Plate 20,000 RPM (Left Hand Rotation)	1
812164-2	Cylinder Roll Pin	2
843913-5	Rotor Collar	1
847095-7	Rear Rotor Ball Bearing	1
847511-3	Front Rotor Ball Bearing	1
864232-4	Rear Bearing Plate 600 & 6,000 RPM (Right Hand Rotation)	1
864234-0	Rotor Blade	4
864236-5	Cylinder	1
864335-5	Motor Bearing Cap	1

600 RPM GEAR TRAIN

* OPTIONAL SHIMS
864730-7- .001 Opt.
864731-5- .002 Opt.
864732-3- .005 Opt.
623765-5- .006 Std.

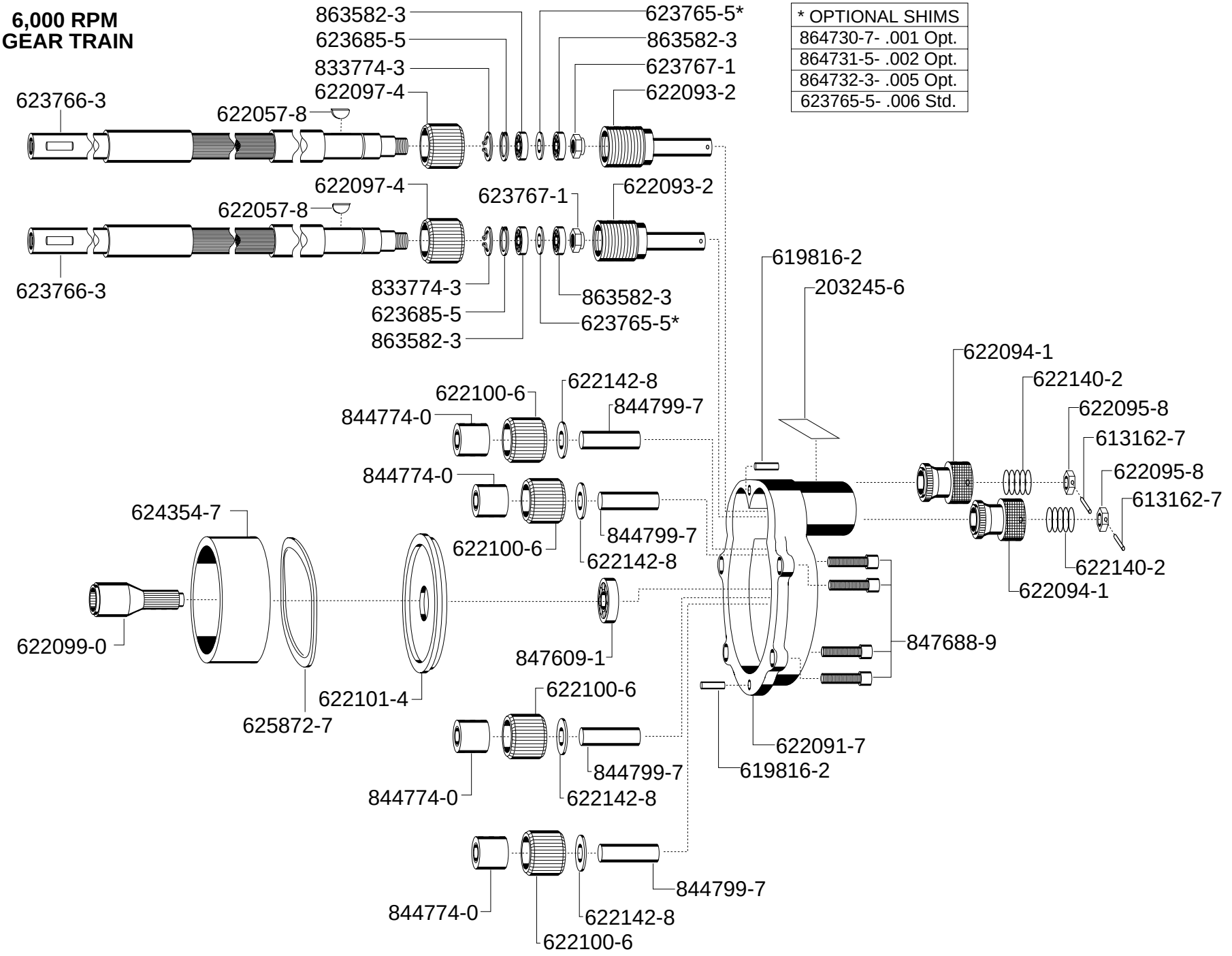


600 RPM GEAR TRAIN PARTS LIST

MODEL NO.	NAME OF PART	QTY.
203245-6	Caution Label (included in 622091)**	1
613126-2	Gear Pinion Spur Retainer Ring	1
613162-7	Spindle Roll Pin*	2
615553-5	Carrier Bearing	1
619816-2	Backhead Dowel Pin (included in 622091)**	2
622057-8	Spindle Key*	2
622091-7	Backhead (includes 202903, 619816, 847609)	1
622093-3	Spindle Adjustment Screw*	2
622094-1	Adjustment Knob	2
622095-8	Adjustment Drive Ring	2
622097-4	Spindle Gear*	2
622100-6	Idler Gear	4
622101-4	Gear Plate	1
622102-2	Internal Gear	1
622103-0	Planet Wheel	2
622104-8	Planet Carrier Spacer	1
622105-5	Planet Carrier	1
622106-3	Gear Pinion Spur	1
622140-2	Adjustment Knob Spring	2
622142-8	Idler Gear Spacer	4
623685-5	Spindle Bearing Retainer Ring*	2
623765-5	Spindle Bearing Spacer .006" (Standard)*	Variable
623766-3	Spindle*	2
623767-1	Spindle Lock Nut*	2
625872-7	Wavy Washer	Variable
813162-7	Spindle Retainer Pin	2
833774-3	Spindle Gear Retainer Ring*	2
842654-6	1st Reduction Spider Idler Gear Pin	2
844774-0	Idler Gear Bearing	6
844799-7	Idler Gear Pin (4 included in 622091)**	4
847609-1	Backhead Bearing (inclued in 622091)**	1
847688-9	Backhead Bolt	4
863582-3	Spindle Bearing*	2
864730-7	Spindle Bearing Spacer .001" (Opt.)	Variable
864731-5	Spindle Bearing Spacer .002" (Opt.)	Variable
864732-3	Spindle Bearing Spacer .005" (Opt.)	Variable
	SPINDLE ASSEMBLY ~~6~~21445-6 ~~*~~ Parts included in Spindle Assembly.	
	BACKHEAD ASSEMBLY ~~6~~22091-7 ~~**~~Parts included in Backhead Assembly	
	CONVERSION KIT ~~6~~00 RPM to 6000 RPM ~~6~~21446-4 6000 RPM to 600 RPM ~~6~~21447-2	

6,000 RPM GEAR TRAIN

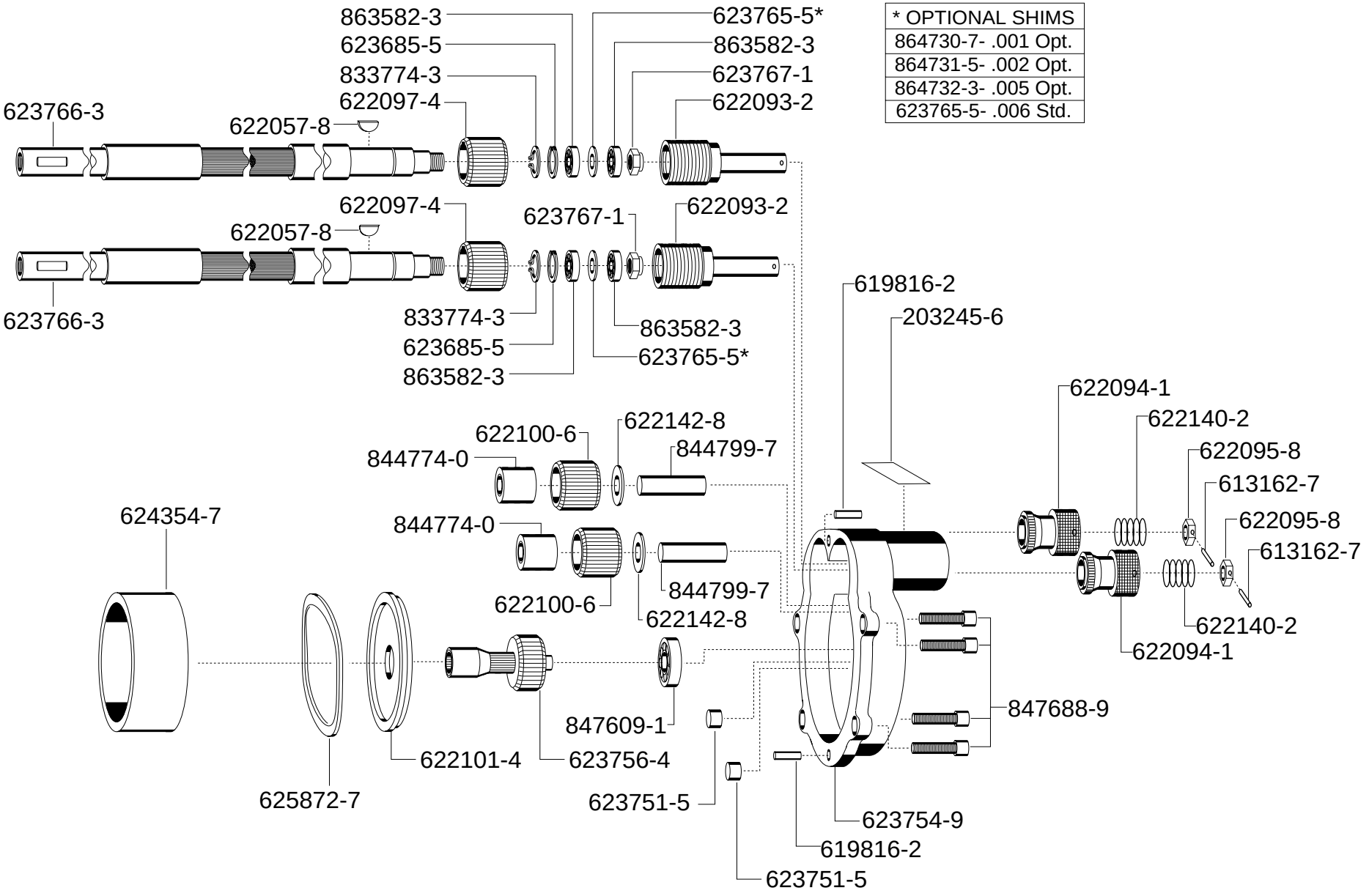
* OPTIONAL SHIMS
864730-7- .001 Opt.
864731-5- .002 Opt.
864732-3- .005 Opt.
623765-5- .006 Std.



6,000 RPM GEAR TRAIN PARTS LIST

MODEL NO.	NAME OF PART	QTY.
203245-6	Caution Label (included in 622091)**	1
613162-7	Spindle Roll Pin*	2
619816-2	Backhead Dowel Pin (included in 622091)**	2
622057-8	Spindle Key*	2
622091-7	Backhead (includes 202903, 619816, 847609)	1
622093-3	Spindle Adjustment Screw*	2
622094-1	Adjustment Knob	2
622095-8	Adjustment Drive Ring	2
622097-4	Spindle Gear*	2
622099-0	Pinion Gear	1
622100-6	Idler Gear	4
622101-4	Gear Plate	1
622140-2	Adjustment Knob Spring	2
622142-8	Idler Gear Spacer	4
623685-5	Spindle Bearing Retainer Ring*	2
623765-5	Spindle Bearing Spacer .006" (Standard)*	Variable
623766-3	Spindle*	2
623767-1	Spindle Lock Nut*	2
624354-7	Gear Plate Spacer	1
625872-7	Wavy Washer	Variable
813162-7	Spindle Retainer Pin	2
833774-3	Spindle Gear Retainer Ring*	2
844774-0	Idler Gear Bearing	4
844799-7	Idler Gear Pin	4
847609-1	Backhead Bearing (included in 622091)**	1
863582-3	Spindle Bearing*	2
864730-7	Spindle Bearing Spacer .001" (Opt.)	Variable
864731-5	Spindle Bearing Spacer .002" (Opt.)	Variable
864732-3	Spindle Bearing Spacer .005" (Opt.)	Variable
	SPINDLE ASSEMBLY ~~6~~21445-6 ~~*~~Parts included in Spindle Assembly.	
	BACKHEAD ASSEMBLY ~~6~~22091-7 ~~**~~Parts included in Backhead Assembly	
	CONVERSION KIT ~~6~~00 RPM to 6000 RPM ~~6~~21446-4 6000 RPM to 600 RPM ~~6~~21447-2	

20,000 RPM
GEAR TRAIN



* OPTIONAL SHIMS
864730-7- .001 Opt.
864731-5- .002 Opt.
864732-3- .005 Opt.
623765-5- .006 Std.

20,000 RPM GEAR TRAIN PARTS LIST

MODEL NO.	NAME OF PART	QTY.
203245-6	Caution Label (included in 623754)**	1
613162-7	Spindle Roll Pin*	2
622057-8	Spindle Key*	2
622093-3	Spindle Adjustment Screw*	2
622094-1	Adjustment Knob	2
622095-8	Adjustment Drive Ring	2
622097-4	Spindle Gear*	2
622099-0	Pinion Gear Spur	1
622100-6	Idler Gear	2
622101-4	Gear Plate	1
622140-2	Adjustment Knob Spring	2
622142-8	Idler Gear Spacer	2
623685-5	Spindle Bearing Retainer Ring*	2
623751-5	Backhead Plug (included in 623754)**	2
623756-4	Pinion Gear	1
623765-5	Spindle Bearing Spacer .006" (Standard)*	Variable
623766-3	Spindle*	2
623767-1	Spindle Lock Nut*	2
624354-7	Gear Plate Spacer	1
625872-7	Wavy Washer	Variable
833774-3	Spindle Gear Retainer Ring*	2
844774-0	Idler Gear Bearing	2
844799-7	Idler Gear Pin (included in 623754)**	2
847609-1	Backhead Bearing (included in 623754)**	1
863582-3	Spindle Bearing*	2
864730-7	Spindle Bearing Spacer .001" (Opt.)	Variable
864731-5	Spindle Bearing Spacer .002" (Opt.)	Variable
864732-3	Spindle Bearing Spacer .005" (Opt.)	Variable
	SPINDLE ASSEMBLY ~~6~~21445-6 ~~*~~Parts included in Spindle Assembly.	
	BACKHEAD ASSEMBLY ~~6~~23754-9 ~~**~~Parts included in Backhead Assembly	

TROUBLESHOOTING GUIDE FOR 15 NUT PLATE DRILL MOTOR

SYMPTOM	REASON	SOLUTION
Air motor and/or clamp and feed functions do not start when trigger is depressed.	Trigger or pilot valves clogged with foreign matter.	Disconnect air line then remove trigger and pilot valves and inspect for debris. Inspect "O"-rings and replace if necessary.
Air motor does not run when trigger is depressed, but feed and clamp functions work properly.	Gears damaged or jammed with debris.	With air line disconnected from tool, remove backhead, clean and inspect hears for damage and check both spindles for free rotation.
	Foreign matter in motor inlet.	Remove motor and clean debris from the motor inlet ports.
	Motor throttle valve adjusted too far, stopping air flow to motor.	Adjust valve until end of valve stem is flush with the end of housing.
	Broken rotor blades, rotor or gear bearings.	Remove motor and inspect rotor blades and bearings. Replace if necessary.
Air motor "idles" when trigger is released.	Pilot valve sticky (not fully closed), or bad "O"-rings on valve sleeve.	Remove and inspect valve for debris and for free movement of valve spool. Inspect "O"-rings, lubricate and reassemble.
	Leaking "O"-ring on air motor rear bearing support.	Remove and inspect "O"-rings. Replace if necessary and reassemble.
Motor runs and the tool clamps workpiece but does not feed.	Feed control needle valve "closed".	Turn feed control needle valve counterclockwise until feed commences.
	Debris in hydraulic system.	Remove feed control valve needle and bleed hydraulic system until fluid is clear.
Tool lunges during feed or when drills exit the far side of the workpiece or variation in feed rate.	Air in hydraulic system.	If air in hydraulic system continues to be a problem, remove the hydraulic reservoir piston and check or replace its "O"-rings. Also check or replace the inner and outer "O"-rings on the pressure head located in the main cylinder.
	Damaged or worn "O"-ring on collet piston.	Check or replace "O"-ring.